

MICROSCAN[®]

AutoVISION Software User's Manual



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For technical support, e-mail: helpdesk@microscan.com.

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About AutoVISION Software

Microscan's AutoVISION is the easiest-to-use machine vision software available for vision applications of basic to moderate complexity. Process and manufacturing engineers no longer need to become experts in machine vision to successfully deploy a system that meets their traceability, inspection, and quality control needs.

Intuitive User Interface

AutoVISION features an intuitive user interface that guides users through the steps of connecting to a device, programming a job, and monitoring results. At startup, AutoVISION automatically detects all compatible devices and allows the user immediately to begin configuration. AutoVISION can also be used in an Emulator mode with stored images from a PC. As a device is being configured or while a user is programming a job, AutoVISION provides real-time feedback and results. Because the runtime interface is built into AutoVISION's user interface, at any point in the process a user can try out a job and determine if the device is configured to meet the application's needs.

Complete Tool Set

AutoVISION's capabilities start with a **Locate Tool** that is based on pattern matching. The Locate Tool can be used to orient other inspection tools or to detect the absence or presence of complex objects. AutoVISION also includes Microscan's powerful X-Mode decode algorithm for **1D and 2D symbol reading** along with fixed font and fully teachable **OCR** for track and trace applications. For inspection and control applications, AutoVISION includes simple yet powerful **Count**, **Presence/Absence**, **Measure**, **Match Strings**, **String Format**, **Logic**, **OCV**, and **Symbol Quality Verification** tools.

Scalable with Visionscape

For applications demanding more flexibility or configuration options, AutoVISION allows users to upgrade to full Visionscape functionality while continuing to work with the same camera hardware. AutoVISION jobs (.avp) can be opened with Visionscape, which enables scripting and other advanced programming capabilities. Visionscape can be deployed on both smart camera and PC-based systems.

Note: You must have Administrator permissions to install and run AutoVISION and Visionscape.



1 Quick Start

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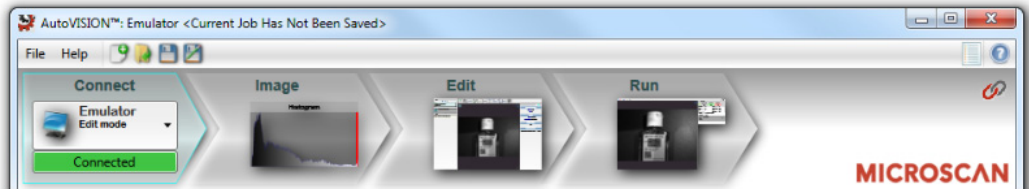
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This section describes how to set up a simple vision job quickly so you can get a sense of AutoVISION's capabilities. Detailed setup information is available in subsequent sections.

AutoVISION Overview

Navigator Bar



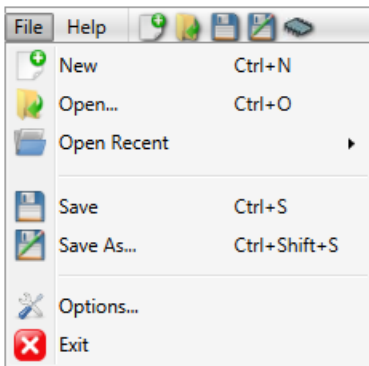
The **Navigator Bar** allows for quick switching between views.

There are four main views within AutoVISION:

- **Connect:** Select a device
- **Image:** Adjust image settings such as Focus, Gain, and Shutter
- **Edit:** Build an inspection using machine vision tools and adjust job settings
- **Run:** Monitor the status of a running job

File Menu

The **File Menu** allows you to **Save** a job (*.avp), **Save As**, **Open**, **Open Recent**, create a **New Job**, or **Exit**. The New, Open, Save, and Save As... options are also available on the toolbar as icons that match the icons shown in the dropdown menu.

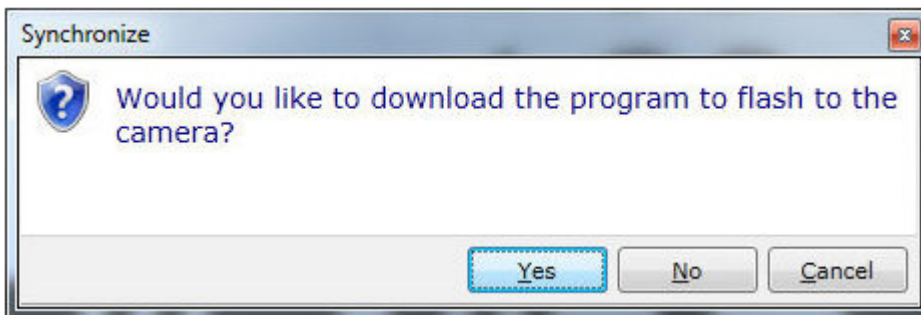


- **New:** Start a new job
- **Open:** Open a saved job
- **Open Recent:** Open a recent job
- **Save:** Save current job
- **Save As...:** Rename and save current job
- **Options:** Open AutoVISION Options dialog
- **Exit:** Exit current job or close AutoVISION

File Menu Toolbar

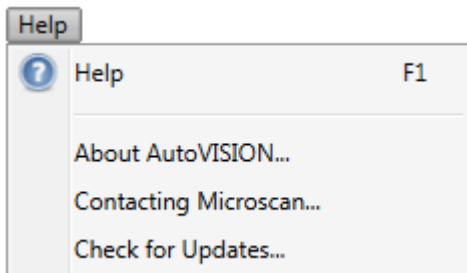


The available commands in the file menu toolbar include **Create a New Job**, **Open an Existing Job**, **Save Job to Disk**, **Save Job with a New Filename**, and **Save Job to Flash**. If the user selects the flash option, AutoVISION will ask if they want to download the job to the camera before saving the job to flash.



Help Menu

The Help dropdown menu allows you to see AutoVISION Help, the About AutoVISION dialog, a Contacting Microscan dialog, and a Check for Updates dialog.



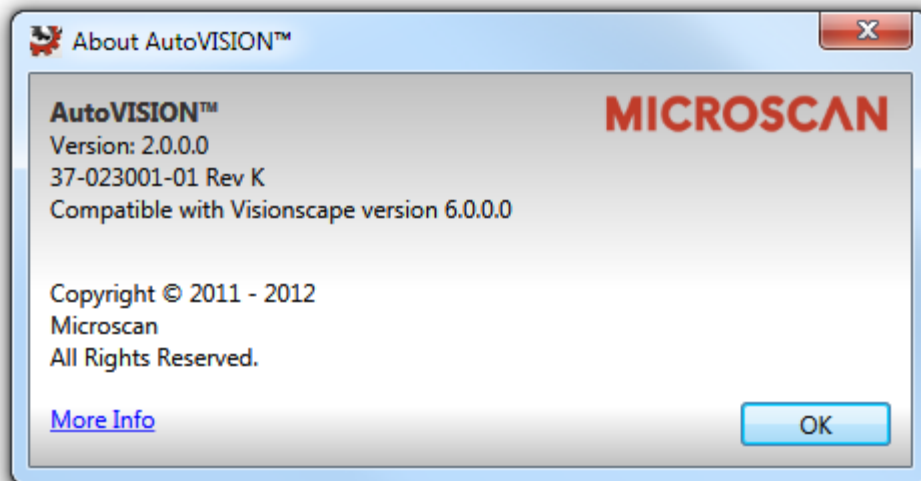
The help documentation can be opened from the Help dropdown menu, the F1 key, or the help icon on the right side of the application:



The help file will be closed when the application is closed or when the user closes the help file.

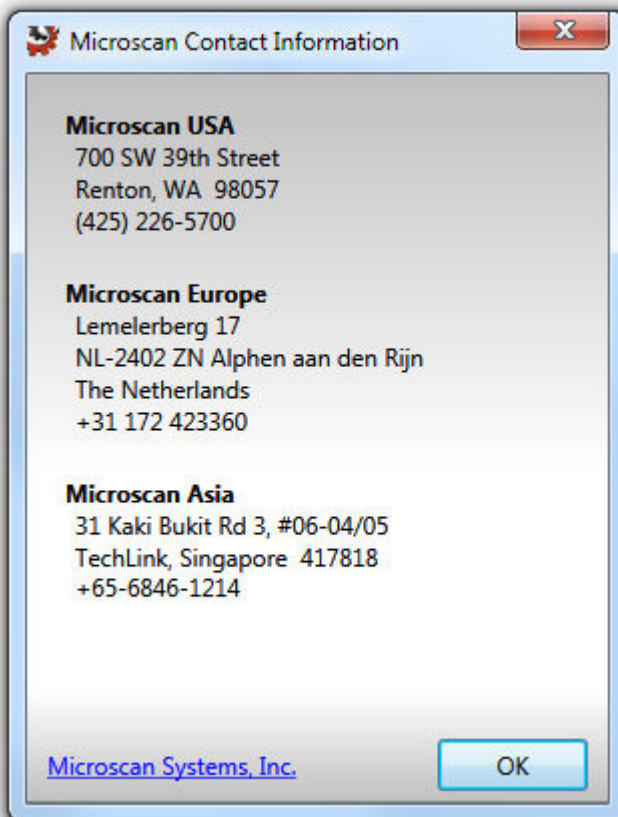
About AutoVISION

The About AutoVISION dialog shows the name and version of the software, as well as the part number and copyright information. Clicking More Info takes the user to an AutoVISION Support page on the Microscan website.



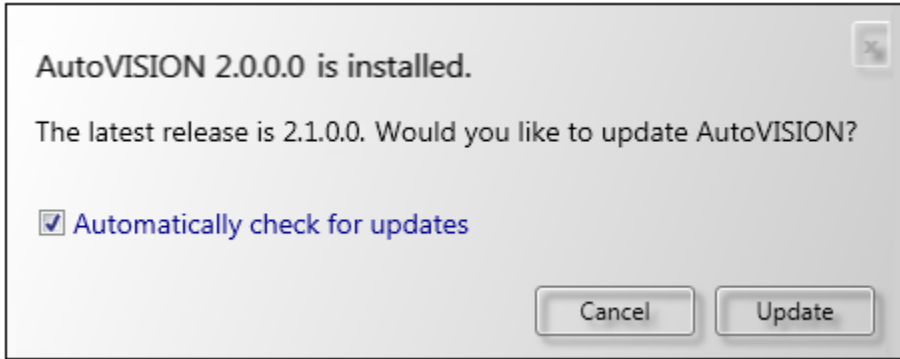
Contacting Microscan

The Microscan Contact Information dialog shows the primary addresses of Microscan's global headquarters. There is also a link to the Microscan website.

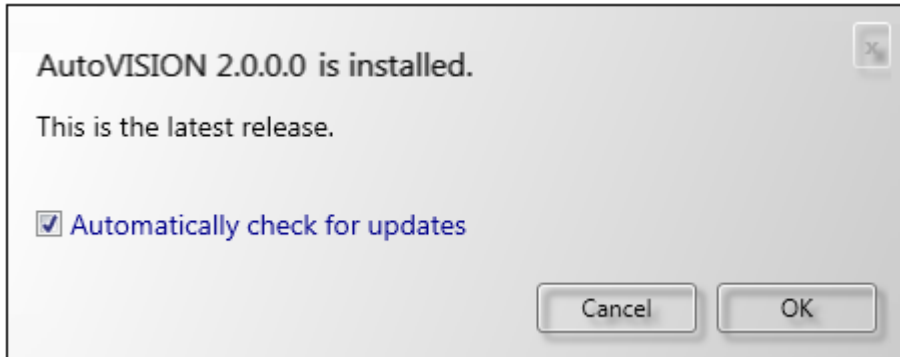


Check for Updates

When you select **Check for Updates** from the Help dropdown, AutoVISION determines whether or not you are running the most current version of the software. If your version of AutoVISION is not current, the dialog below will appear.



If your version of AutoVISION is current, this dialog will be displayed:



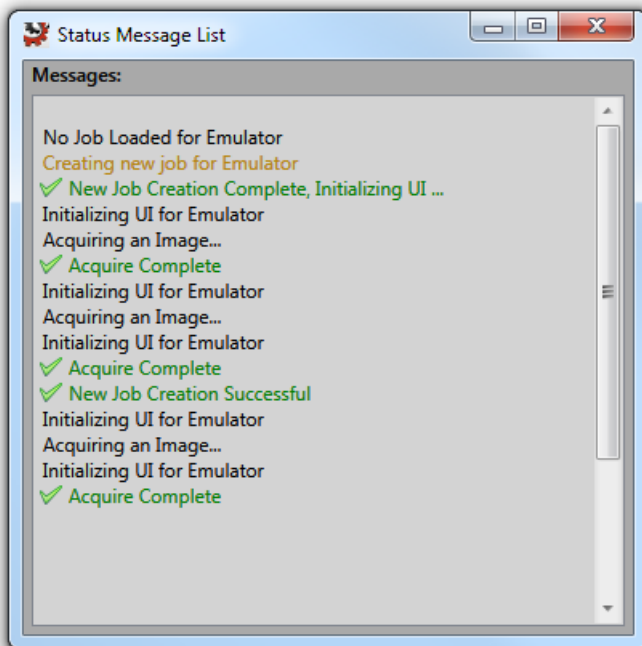
If you check the **Automatically check for updates** box, AutoVISION will check for newer versions of the software once a week. Every time you check for a newer version yourself, AutoVISION's "check for updates" timer is reset.

Status Message List

The **Status Message List** can be opened by clicking the Status Message List icon to the left of the help icon in the upper right of the screen:



The Status Message List allows you to view a history of all status messages shown by AutoVISION during the current session.



Status Bar

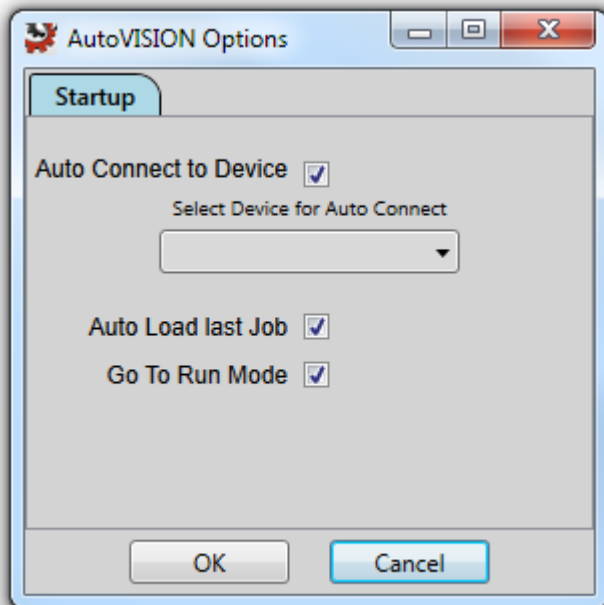
Vision	10.0.1.15	VisionHawkWVGA	251	28,52
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The status bar appears at the bottom of the main window and contains the following information:

- The currently selected device;
- Device IP address;
- The grayscale value under the cursor (when hovering over the image);
- The X,Y position of the cursor in pixel coordinates.

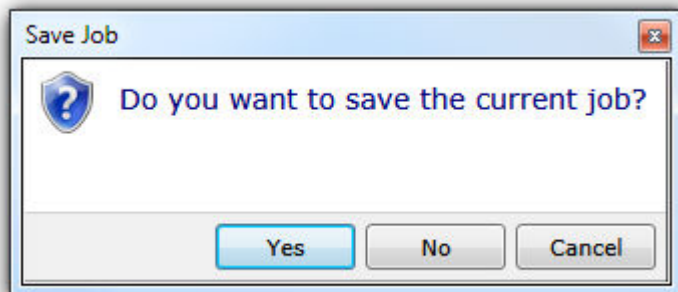
AutoVISION Options

The **AutoVISION Options** dialog allows you to control AutoVISION's startup behavior. You can set the software to Auto Connect to a smart camera that you select from the dropdown menu, to Auto Load the most recent job, and to go directly to Run mode at startup.



Save Dialog

The **Save Dialog** will appear when you attempt to Exit the current job or close AutoVISION.



Vision HAWK Hardware

There are six steps to set up a Vision HAWK Smart Camera:

1. **Configure hardware.** Set up the camera, cabling, power supply, and I/O.
2. **Select a device and create a new job.** Use the Connect view to select a device and create a new job or load an existing job.
3. **Adjust camera settings.** Use the Connect and Image views to adjust parameters specific to the connected smart camera.
4. **Edit the job.** Use the Camera parameters in the Edit view to adjust acquisition settings, and use Inspection Outputs parameters to configure job outputs.
5. **Run the job.** Jobs are downloaded to the camera when moving to the Run view, but are not saved yet.
6. **Save the job.** Stop the job and click the Save icon to save the current job in the camera, but don't forget to start the job again.

The following sections discuss these steps in greater detail.

The Vision HAWK is designed for industrial applications. It features a rugged enclosure and an infinite focal distance. It is capable of higher line speeds and can run multiple AutoVISION tools simultaneously.

Package: Rugged, industrial

Power Input: High-immunity 5-28V

I/O: 1-28V optoisolated

Optics: 1" and greater working distance; 15, 30, 45 degree interchangeable lenses; liquid lens autofocus

Machine Vision Capabilities: Can run multiple AutoVISION tools at high speed

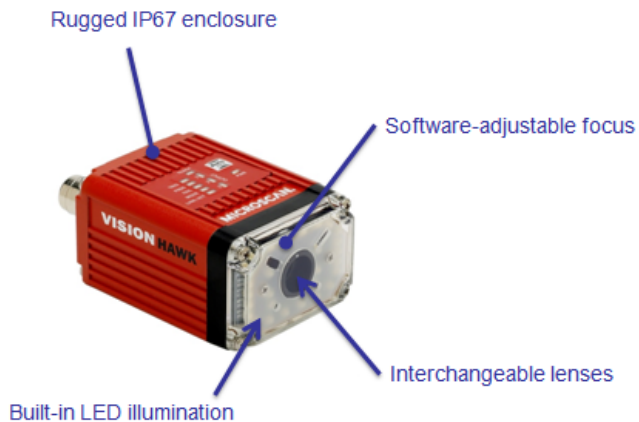
Motion Capabilities: Indexed, static to high speed

Sensor: SXGA CCD monochrome sensor or WVGA CMOS monochrome sensor

Communications: Ethernet, Serial

Accessories: Direct connect; accessories available

Vision HAWK Characteristics

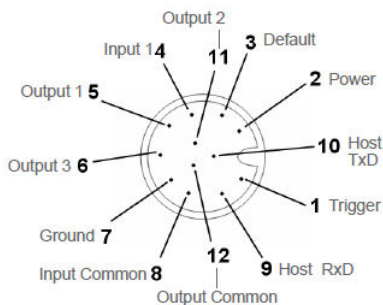
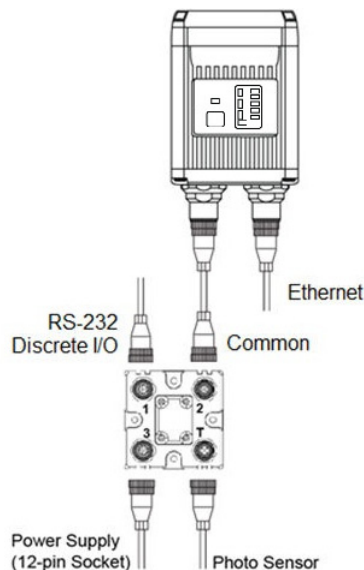


- IP67 connectors
- Supports M12 connectors
 - Standard M12 Ethernet connector

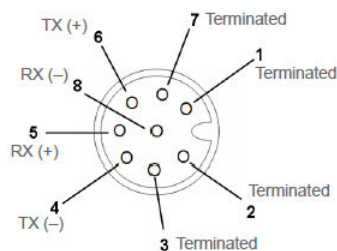


Vision HAWK Hardware Configuration

1. Mount the camera as required by the application.
2. Connect the Ethernet cable from "B" on the camera to the network.
3. Connect the power supply to "3" on the QX-1.
4. Connect the photo sensor to "T" on the QX-1.
5. Connect the "Common" cable to "2" on the QX-1 and "A" on the camera.
6. Plug in the power supply.



**Connector A: M12
12-Pin Plug**



**Connector B: M12
8-Pin**

Note: Connector A contains all I/O.

Vision HAWK C-Mount Hardware

There are six steps to set up a Vision HAWK C-Mount Smart Camera:

1. **Configure hardware.** Set up the camera, cabling, power supply, and I/O.
2. **Select a device and create a new job.** Use the Connect view to select a device and create a new job or load an existing job.
3. **Adjust camera settings.** Use the Connect and Image views to adjust parameters specific to the connected smart camera.
4. **Edit the job.** Use the Camera parameters in the Edit view to adjust acquisition settings, and use Inspection Outputs parameters to configure job outputs.
5. **Run the job.** Jobs are downloaded to the camera when moving to the Run view, but are not saved yet.
6. **Save the job.** Stop the job and click the Save icon to save the current job in the camera, but don't forget to start the job again.

The following sections discuss these steps in greater detail.

The Vision HAWK C-Mount is designed for industrial applications. It features a rugged enclosure multiple lens options. It is capable of higher line speeds and can run multiple AutoVISION tools simultaneously.

Package: Rugged, industrial

Power Input: High-immunity 5-28V

I/O: 1-28V optoisolated

Optics: Depends on lens (liquid lens only available for standard Vision HAWK)

Machine Vision Capabilities: Can run multiple AutoVISION tools at high speed

Motion Capabilities: Indexed, static to high speed

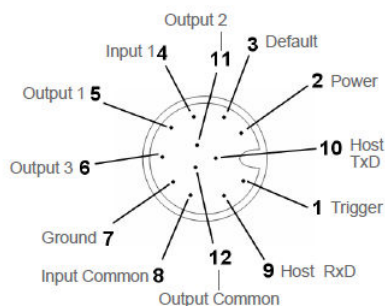
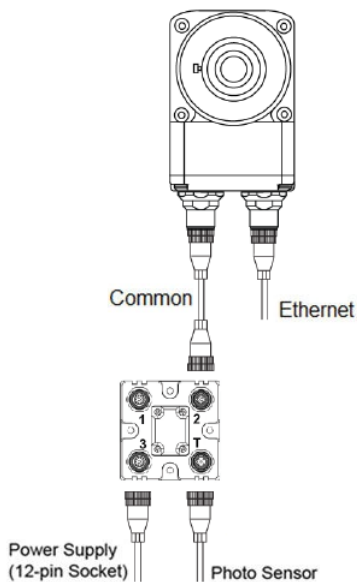
Sensor: SXGA CCD monochrome sensor, WUXGA CMOS monochrome sensor, or WVGA CMOS monochrome sensor

Communications: Ethernet, Serial

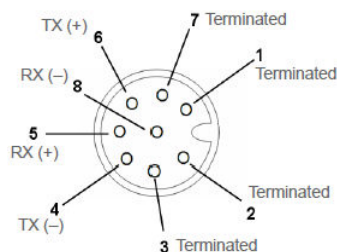
Accessories: Direct connect; accessories available

Vision HAWK C-Mount Hardware Configuration

1. Select lens as required by the application.
2. Mount the camera as required by the application.
3. Connect the Ethernet cable from "B" on the camera to the network.
4. Connect the power supply to "3" on the QX-1.
5. Connect the photo sensor to "T" on the QX-1.
6. Connect the "Common" cable to "2" on the QX-1 and "A" on the camera.
7. Plug in the power supply.



**Connector A: M12
12-Pin Plug**



**Connector B: M12
8-Pin**

Note: Connector A contains all I/O.

Vision MINI Hardware

There are six steps to set up a Vision MINI Smart Camera:

1. **Configure hardware.** Set up the camera, cabling, power supply, and I/O.
2. **Select a device and create a new job.** Use the Connect view to select a device and create a new job or load an existing job.
3. **Adjust camera settings.** Use the Connect and Image views to adjust parameters specific to the connected smart camera.
4. **Edit the job.** Use the Camera parameters in the Edit view to adjust acquisition settings, and use Inspection Outputs parameters to configure job outputs.
5. **Run the job.** Jobs are downloaded to the camera when moving to the Run view, but are not saved yet.
6. **Save the job.** Stop the job and click the Save icon to save the current job in the camera, but don't forget to start the job again.

The following sections discuss these steps in greater detail.

The Vision MINI is designed for embedded applications. It features a small enclosure and low power requirements. It is capable of running a couple AutoVISION tools simultaneously. The SXGA MINI is a good choice for lower line speeds, while the WVGA MINI can handle higher line speeds.

Package: Compact, lightweight, IP54

Power Input: Lower power 5V

I/O: 5V TTL compatible

Optics: 2-6" mechanical focus, fixed lens

Machine Vision Capabilities: Can run a limited number of simple tools

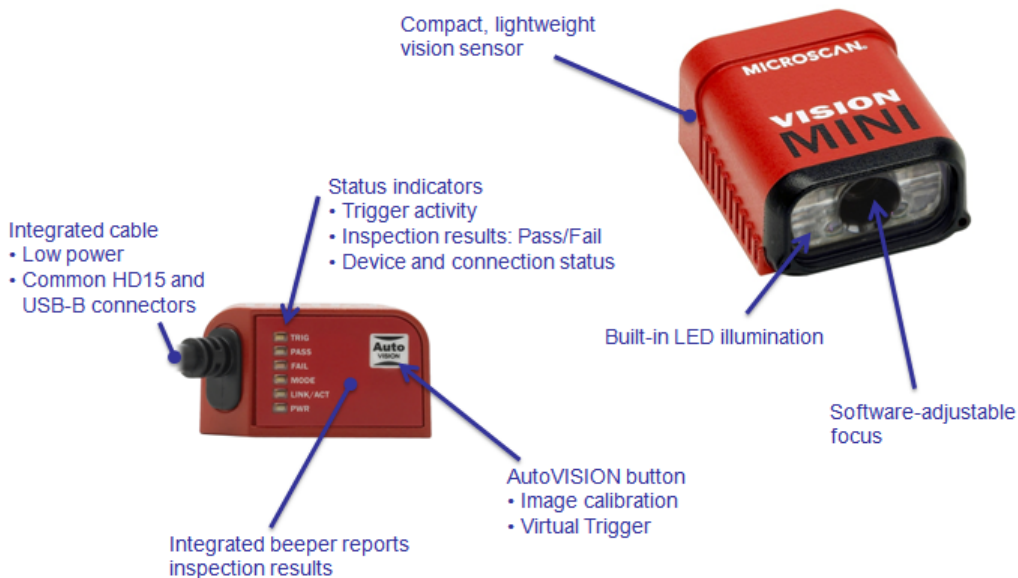
Motion Capabilities: Indexed, static to low speed (SXGA); Indexed, static, low, high speed (WVGA)

Sensor: SXGA or WVGA CMOS monochrome sensor

Communications: Virtual Ethernet over USB

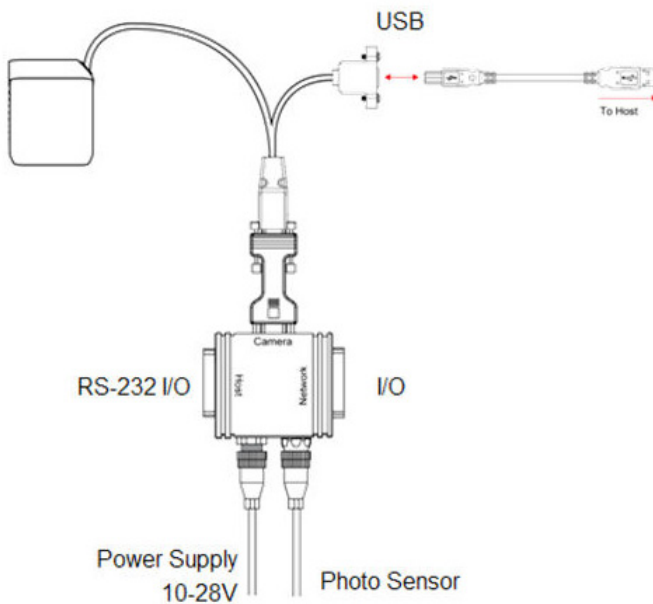
Accessories: Accessories required (IB-131 and IC-332)

Vision MINI Characteristics



Vision MINI Hardware Configuration

1. Mount the camera as required by the application.
2. Connect the USB side of the camera cable to the USB host cable.
3. Connect the IC-332 to the IB-131.
4. Connect the D-sub side of the camera cable to the IC-332.
5. Connect the photo sensor to the IB-131.
6. Connect the power supply to the IB-131.
7. Plug in the power supply.



D-sub I/O Connector Pin Assignments

Pin	Host RS-232	In/Out
1	Power +5VDC	In
2	TxD	Out
3	RxD	In
4	Power/Signal Ground	
5	NC	
6	NC	Out
7	Output 1 TTL (Can sink 10mA and souce 10mA)	Out
8	Default configuration (activated by connecting pin 8 to ground pin 4)	In
9	Trigger	In
10	NC	In
11	Output 3 TTL (Can sink 10mA and souce 10mA)	Out
12	Input 1 (NPN)	In
13	Chassis ground (Connects chassis body to earth ground only. Do not use as power or signal return.)	
14	Output 2 TTL (Can sink 10mA and souce 10mA)	Out
15	NC	

USB Type B Connector Pin Assignments

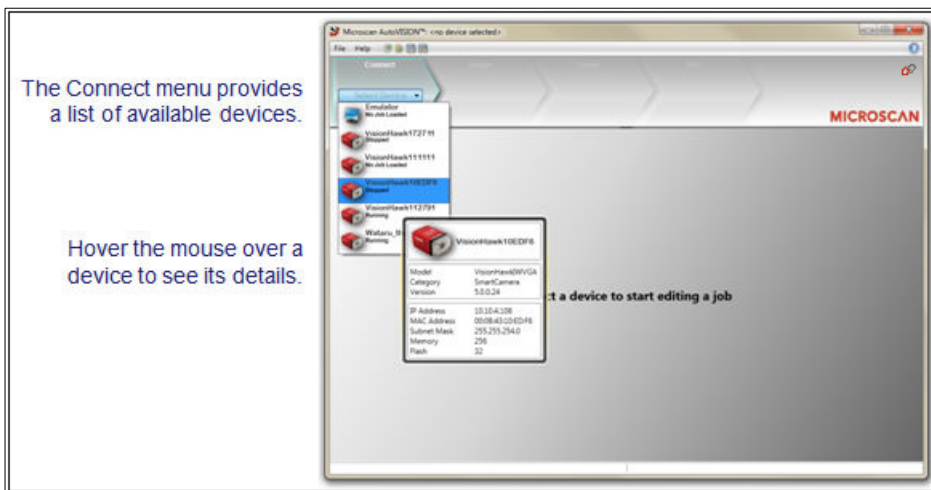
Pin	Function
1	Vbus (5V)
2	D-
3	D+
4	Ground

Select a Device

AutoVISION's **Connect** view allows you to select your device and configure its settings, and to create a new job.

Cameras: Vision HAWK (standard or C-Mount) or Vision MINI.

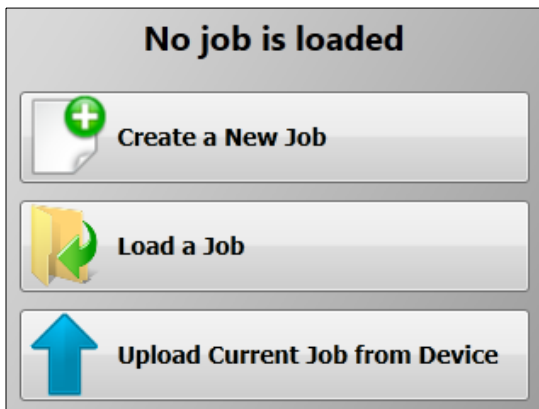
Emulator: The software emulator allows you to work from saved images without hardware.



Once a device is selected, you can **Create a New Job**, **Load a Job** from a saved .avp file on your PC, or **Upload Current Job From Device** (your camera).

- **Job:** A completed program, including image acquisition, tools, and reporting.
- **Tool:** A self-contained set of steps used to perform a specific task.

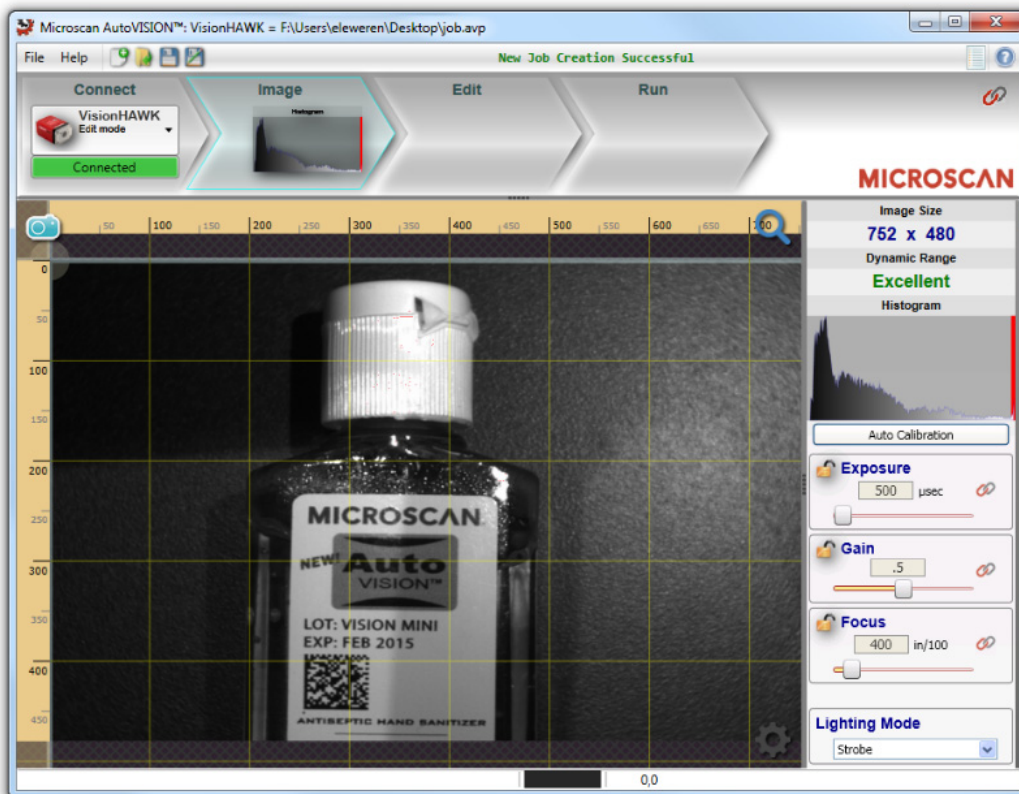
Note: When selecting the Emulator, there is no option to upload a job.



Adjust Camera Settings

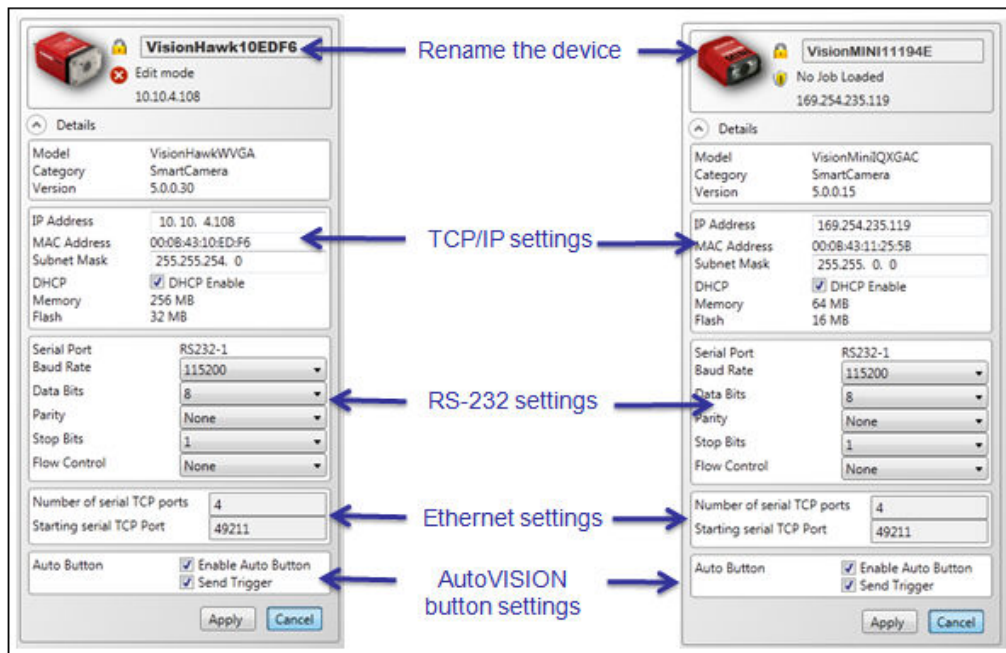
Once you have selected your camera or the Emulator and created a new job, you will move to the **Image** view. This view allows you to **Auto Calibrate** the camera, and to manually adjust the camera's **Exposure**, **Gain**, and **Focus**, and also to set the **Lighting Mode** (**On**, **Off**, or **Strobe**).

Note: If you load a job from your PC or upload a job from the camera, you will automatically move to the **Edit** view.



Adjust Camera Settings

You can return to the **Connect** view and click the **Modify** button to adjust additional camera settings, such as **TCP/IP** settings, **RS-232** settings, **Ethernet** settings, and **AutoVISION** button settings. You can also rename your camera (alphanumeric characters only - [0-9], [a-z], and [A-Z]). Click the **Apply** button when you have adjusted the camera's settings as needed.



Edit the Job

After you have created a new job, loaded a job from your PC, or uploaded a job from the camera, you will proceed to the **Edit** view to refine your machine vision job.

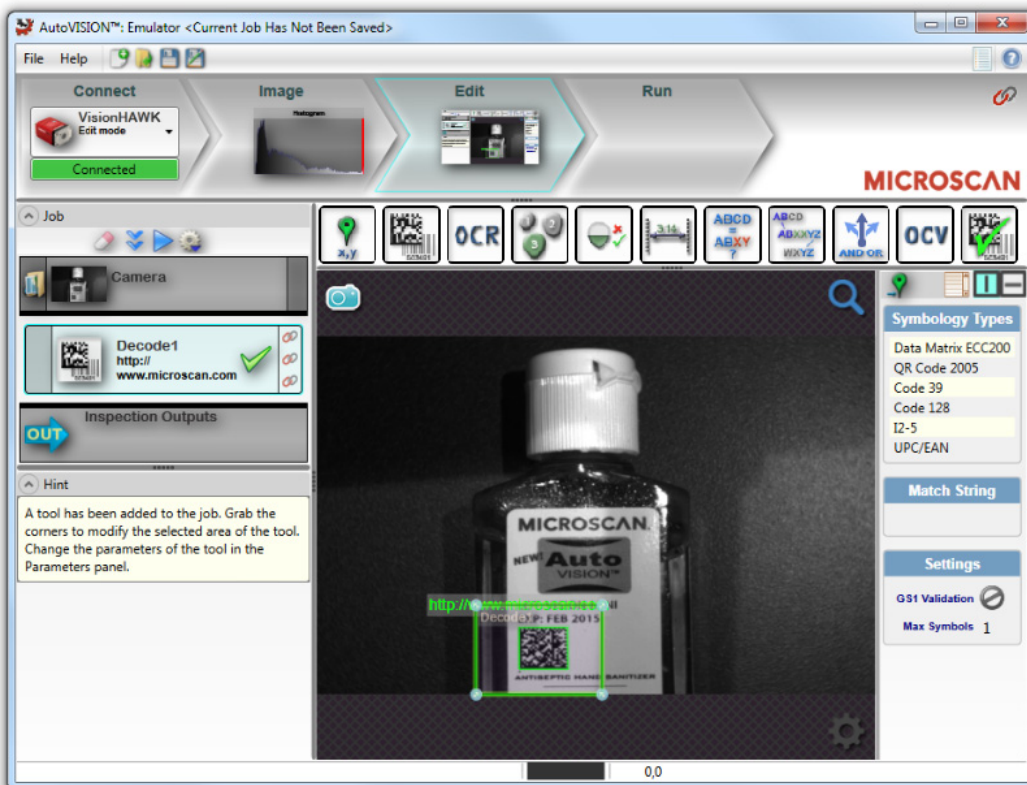
The **Camera** parameters below the captured image allow you to set **Gain**, **Exposure**, **Focus**, **Trigger**, and **Lighting**.

Inspection Outputs options and **Microscan LINK** functionality allow you to connect your job to the outside world.

This is also the view where you can add multiple tools to the job. The tool icons are located above the main view area.

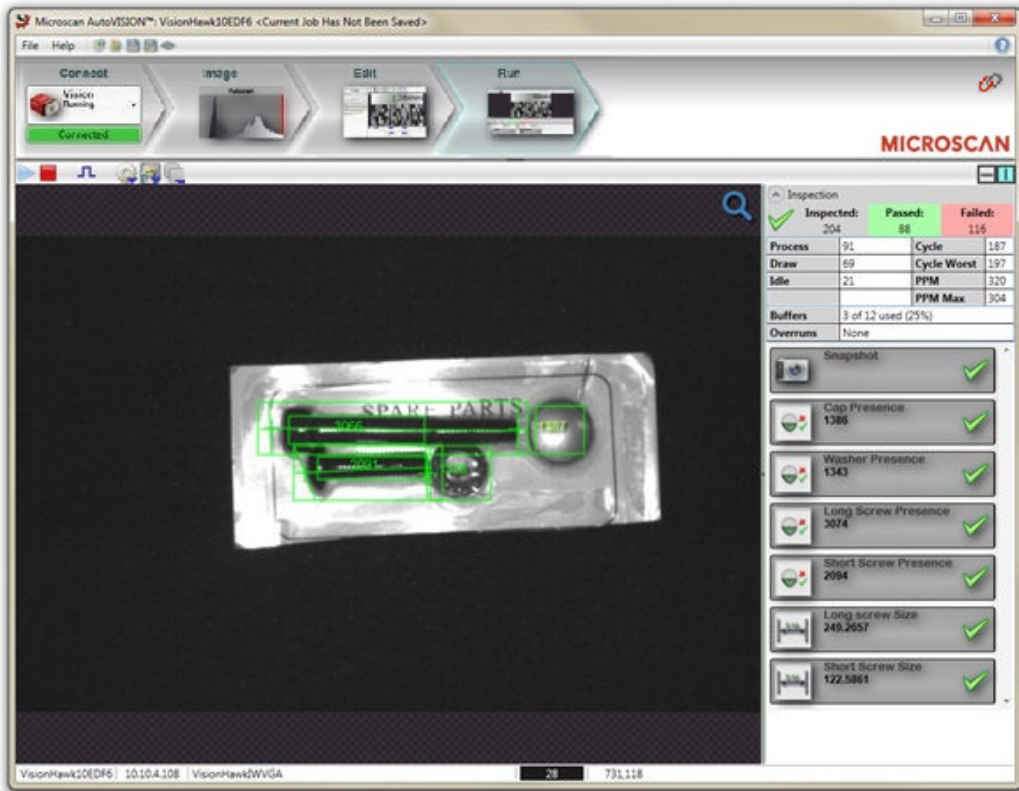


When a tool is selected, it appears in the tool list area to the left of the main view.



Run the Job

Going to the **Run** view will automatically download your job to the camera and start it running.



The Run view provides the following feedback:

- **Image Display:** Displays runtime images with Tool graphics;
- **Inspection Counts:** Displays the number of parts inspected, passed and rejected;
- **Inspection Timing Statistics:** Displays statistics on the speed of your inspection;
- **Tool Results:** Shows the Pass/Fail status and inspection data from each of your tools.

The following options are provided:

- Adjust the speed of the image display;
- Enable/disable graphics display;
- Save uploaded images to the PC;
- Clear the inspection counts.

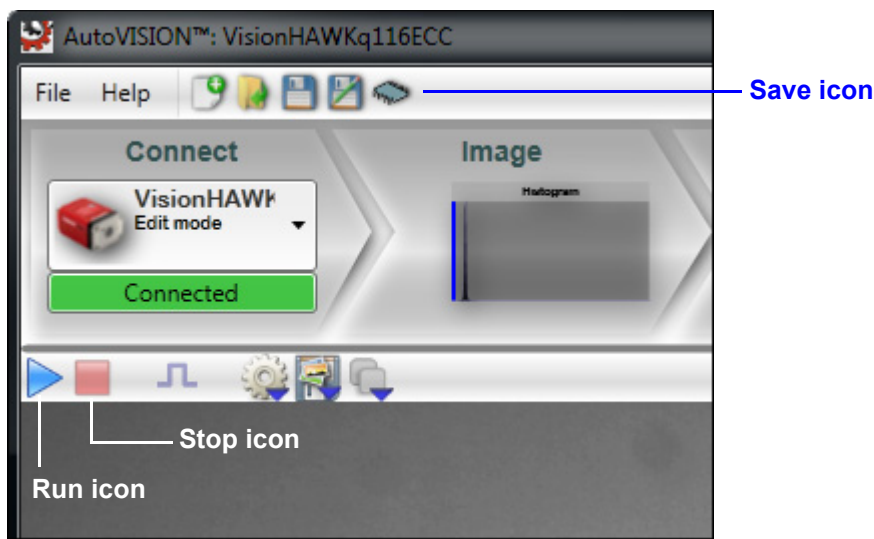
Save the Job

Click the **Save** icon to save the job to the camera's flash memory.

Note: The Save icon shows a popup menu of jobs, allowing you to overwrite existing jobs or to create a new job.



1. Click the **Stop** icon.
2. Click the **Save** icon.
3. Click the **Run** icon to start again.



Note that jobs that are configured to run on stored images, saved, and then opened on a camera, will have their snapshot setting changed to “Acquire”.



2 *Connect*

Contents

Launch the AutoVISION User Interface 2-2

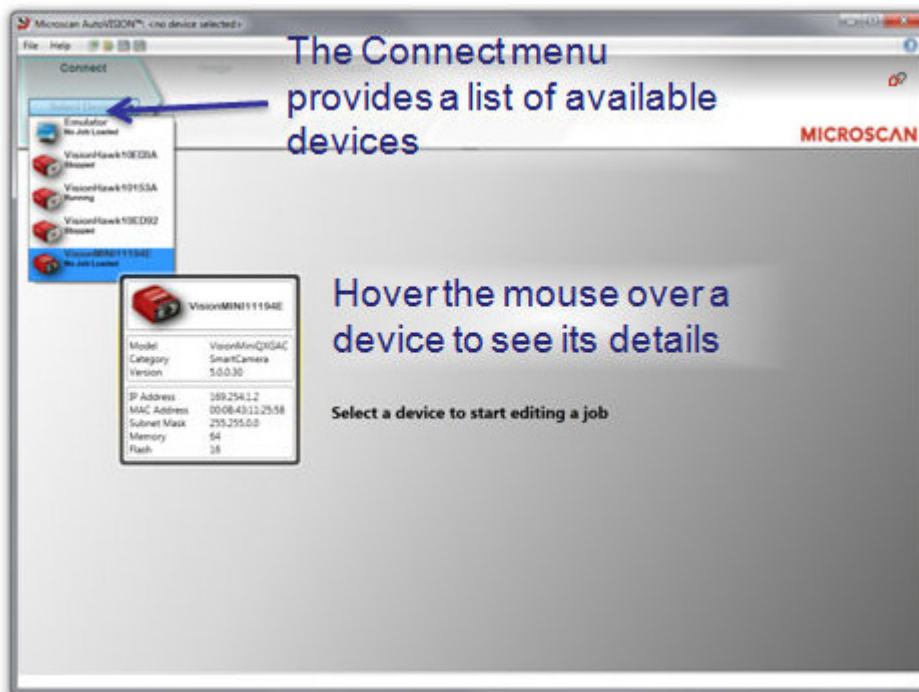
Select Device 2-3

Job Changeover..... 2-5

This section describes how to launch AutoVISION, select a device, and connect.

Launch the AutoVISION User Interface

Double-click the AutoVISION icon on your desktop or go to the Windows Start Menu and navigate to **All Programs > Microscan AutoVISION > AutoVISION**.



Select Device

AutoVISION's **Connect** view allows you to select your device and configure its settings, and to create a new job.

Cameras: Vision HAWK, Vision HAWK C-Mount, or Vision MINI.

Emulator: The software Emulator allows you to work from saved images without hardware.

The Connect menu provides a list of available devices

Hover the mouse over a device to see the details

Click the green icon to take control of the camera. The "Modify" button will appear. Click the "Modify" button to adjust camera settings.

Once connected, the hardware properties are visible.

Connect

- Emulator (No Job Loaded)
- VisionHawk10163A (No Job Loaded)
- VisionHawk10ED92 (No Job Loaded)
- VisionHawk10EDF6 (No Job Loaded)
- VisionHawk10EDF6 (No Job Loaded)

Details

Model: VisionHawkWVGA
Category: SmartCamera
Version: 5.0.0.30

IP Address: 10.10.4.108
MAC Address: 00:0B:43:10:ED:F6
Subnet Mask: 255.255.254.0
DHCP: Enabled
Memory: 256 MB
Flash: 32 MB

Serial Port: RS232-1
Baud Rate: 115200
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None

Number of serial TCP ports: 4
Starting serial TCP Port: 49211

Auto Button: Enabled
Send Trigger

Note: The Vision HAWK's default IP address is **192.168.0.10**.

Once a device is selected, you can **Create a New Job**, **Load a Job** from a saved .avp file on your PC, or **Upload Current Job from Device** (your camera).

No job is loaded

Create a New Job

Load a Job

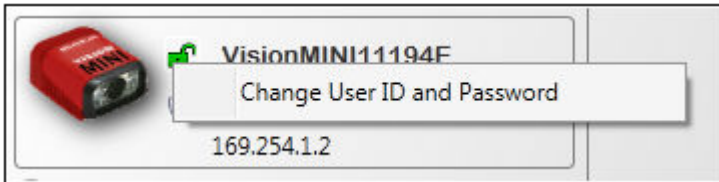
Upload Current Job from Device

Important: AutoVISION is not able to edit jobs that have been manipulated in FrontRunner. Switching jobs between AutoVISION and FrontRunner is not recommended.

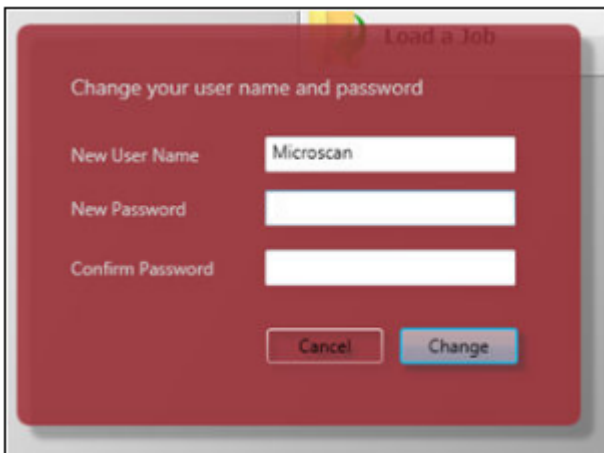
Select Device

You can also create or change a username and password for your camera to protect device settings.

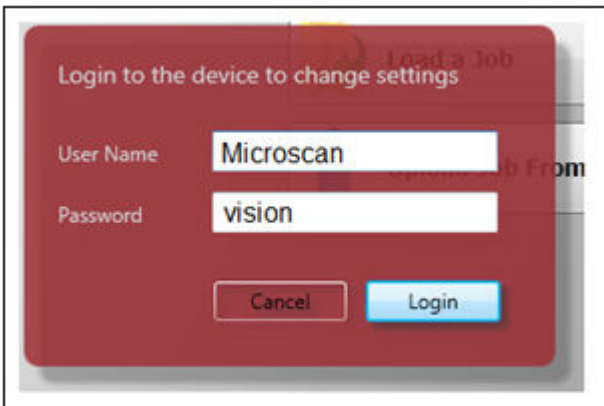
Create or change a username and password by right-clicking on the image of the camera and then clicking **Change User ID and Password**.



Then enter your new username of choice and password of choice and click the **Change** button:



Subsequent attempts to change device settings will require that the current username and password be entered:



Job Changeover

Multiple jobs can be loaded to the Vision HAWK and Vision MINI. You can switch between the jobs without having to download each time. A number of features allow you to manipulate the jobs and retrieve information about the loaded jobs.

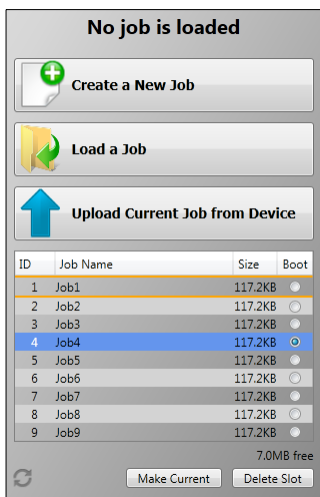
Job Slot – Each job is stored in a corresponding "slot" in the camera's memory, identified by a consecutive list of integers.

Boot Job – This is the job that loads when the camera is powered on.

Current Job – This is the job that is currently loaded in the camera's memory. AutoVISION allows the user to select a job in the job slots and make it the current job.

You can manipulate Job Changeover functionality in AutoVISION's **Connect** view, with the pop-up menu that appears when you click the flash memory icon on the file menu toolbar, and with the pop-up menu in the **Run** view.

When you select a camera that supports Job Changeover, the jobs are shown under the **Upload Current Job from Device** button in the device view.



Note: Job sizes are not shown until you log in to the camera.

From this view you can see the following information about the job:

- Slot ID
- **Job Name** (.avp name)
- **Size** of the job
- Memory available on the camera
- Which job is the **Boot Job**
- Which job is the **Current Job** (highlighted in orange)

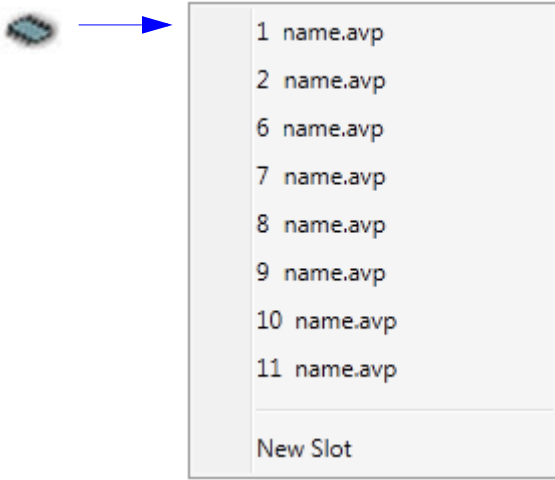
Size represents the amount of memory that would be saved if the job were deleted from the camera. The jobs share support files, so when there are two jobs using the same support files the second one deleted will make more memory available.

You can make a job the current job by selecting it and clicking the **Make Current** button.

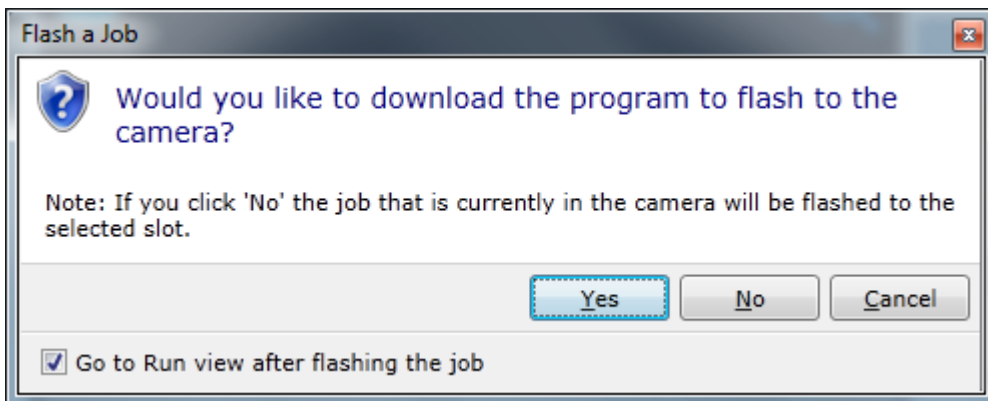
Job Changeover

You can also delete jobs from the camera by selecting a job and clicking the **Delete Slot** button. AutoVISION will warn you if you try to delete the current job, and will automatically reassign the new first job in the list to current.

The pop-up menu that appears when you click the flash memory icon allows you to see all jobs currently on the camera. You can then flash the job that is in the camera's memory or loaded on the computer by selecting a job to overwrite or by selecting **New Slot**.



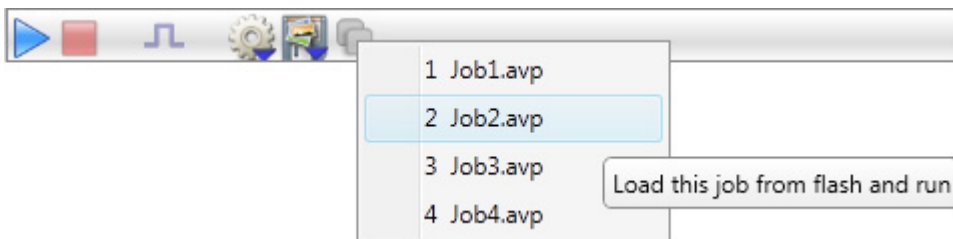
When you select a slot (or New Slot) you will see a dialog asking if you want to download the current job. This allows you either to flash the job in AutoVISION or the job on the camera. If you select New Slot, AutoVISION will search for an open slot or the next corresponding job slot and insert the job in that slot. After the job is flashed it will start running and AutoVISION will switch to the Run view if you have checked “Go to Run view after flashing the job”.



Job Switching

Important: AutoVISION is not able to edit jobs that have been manipulated in FrontRunner. Switching jobs between AutoVISION and FrontRunner is not recommended.

You can switch between jobs in AutoVISION's **Connect** or **Run** views. Click the job switch icon in the Run view to use the dropdown menu shown below.



If a username and password have been defined for the camera, the **Login** dialog will appear.



Job Changeover Serial Commands

Job Changeover serial commands can be sent via TCP (Telnet) port, AutoVISION Terminal, or HyperTerminal.

JOBSAVE [-slot=n]

Save job to slot *n*.

JOBLOAD [-slot=n][-r]

Load job from slot *n*.

-r = Start inspections.

JOBDELETE [-slot=n]

Delete job in slot *n*.

JOBINFO [[-slot=n][-v]

Get job summary or info about slot *n*.

-v = Verbose. This option shows the amount of space that would be freed if the job were deleted. It also lists the total disk space and free disk space.

JOBBOOT {-slot=n}

Set bootup job slot *n*.

JOBDOWNLOAD [-transfer=]{YMODEM}

Download .avz job packaged via transfer method.

JOBDELETE -all

Delete all jobs in job slots.

Important: Does not delete the current job loaded in camera memory.

GET SYSTEM.JOBSLOT

Retrieve the slot of the current job. Note that the current job in the camera can be loaded from a job slot or the PC. If it isn't loaded from a job slot then this command will return -1.

ONLINE

Start all inspections.



3 *Image*

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This section describes AutoVISION's Image area, how to use the image control tools, and how to Auto Calibrate on an acquired image.

Image Overview

The **Image** view allows you to calibrate your camera's focus and lighting settings automatically via the **Auto Calibration** button, or to adjust them manually via the **Exposure**, **Gain**, **Focus**, and **Lighting Mode** parameters. Calibration settings are saved to the camera, as are Exposure, Gain, and Focus settings that are adjusted manually.

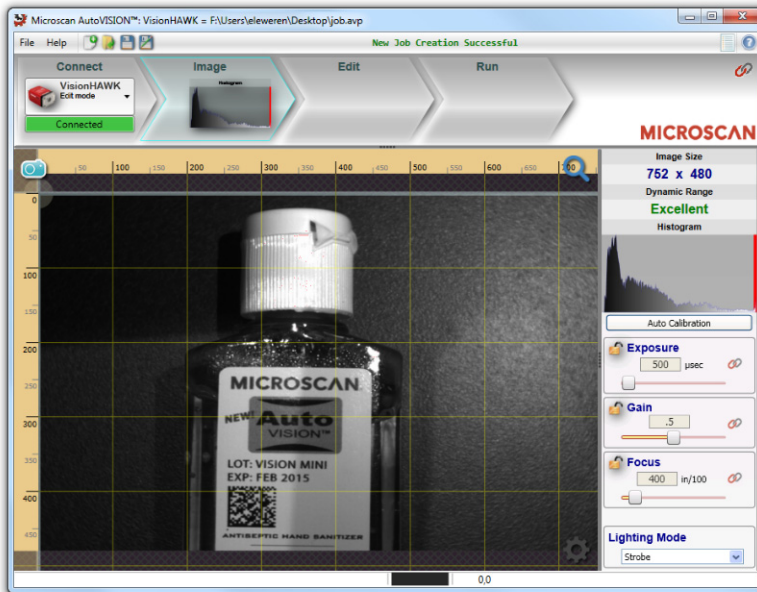
Note: The Vision HAWK C-Mount supports Exposure and Gain Calibration, but not Focus Calibration.

The upper-right corner of the view provides feedback on the current image, including its width and height, the quality of its Dynamic Range (Excellent, Good, Fair, Poor), and a histogram of the image to help you visualize the Dynamic Range. The colors blue and pink in the image are used to show undersaturated (blue) and oversaturated (pink) pixels.

The photometry values (Exposure, Gain, and Focus) shown to the right of the image area are determined either by the AutoVISION job or by photometry values stored on the camera. There are multiple ways these values can be set: manually with the sliders, Auto Calibration in AutoVISION, Auto Calibration with the AutoVISION Button on the camera, and Microscan Link.

When you perform an Auto Calibration, the photometry values can be “locked down” so they are not changed by the calibration process. When a photometry value is “locked” during calibration, the value already stored in the AutoVISION job (not on the camera) is used.

Note: Photometry values must be locked if you intend to tie them to GDS tags using Microscan Link. Locking the values allows any new values that appear in the job to be used. If photometry values are unlocked, the values stored on the camera will be used, but they cannot be changed using Microscan LINK.



Note: Auto Calibration, Exposure, Gain, Focus, and Lighting Mode do not function when the Emulator is being used instead of a camera.

Image Area

The **Image Area** displays the current image and features various tools for controlling the image.

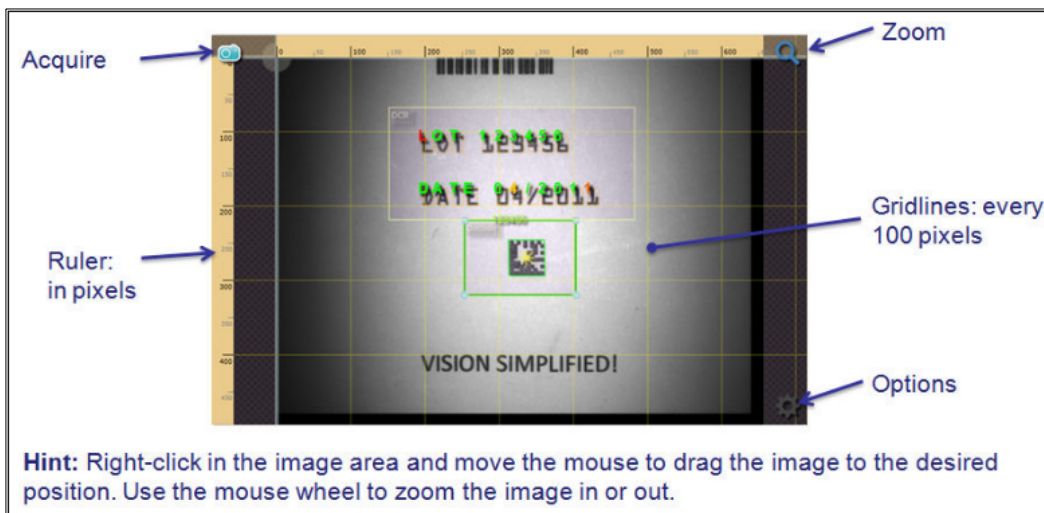
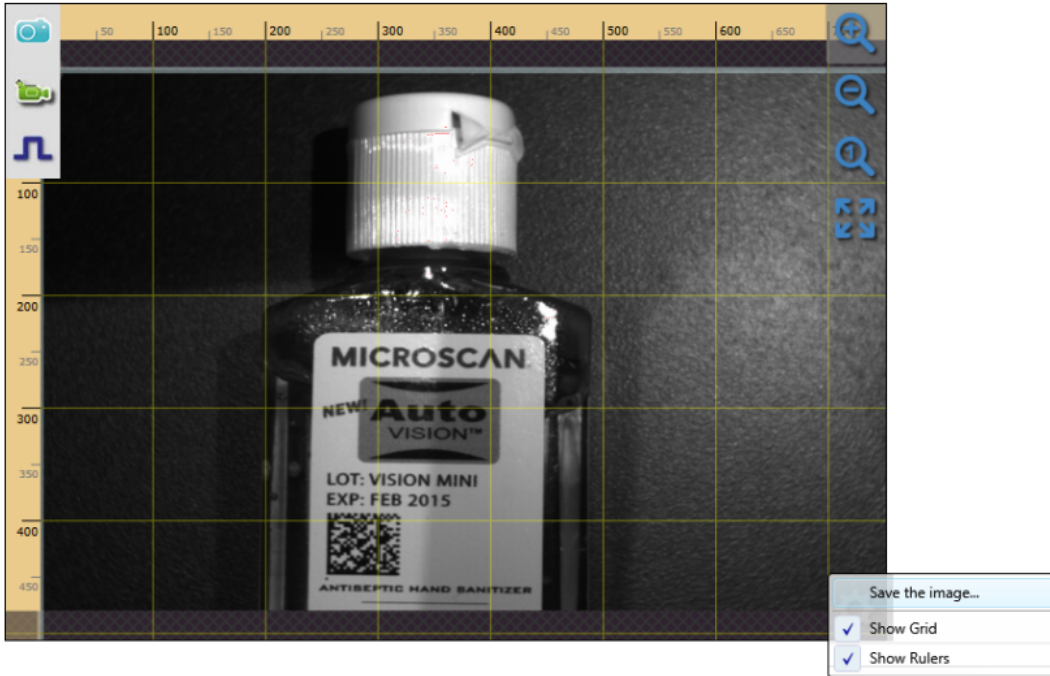


Image Control Tools



Acquire

Acquire Single Image: Takes a single picture.



Acquire Live Images: Live video used for camera and part adjustment.



Enable or Disable Trigger for Image Acquisition: When checked, and your camera has a trigger assigned, Acquire, Live Video and Tryouts will all wait for a trigger before acquiring an image.



Zoom

Zoom In: Makes the image appear larger.



Zoom Out: Makes the image appear smaller.



Actual Size: Shows the image at actual size in pixels.



Fit to Screen: Fits the image to the boundaries of the image area.



Options



Save the image...: Saves the captured image on the PC.

Show Grid: Places grid lines on the image for reference and measurement in pixels.

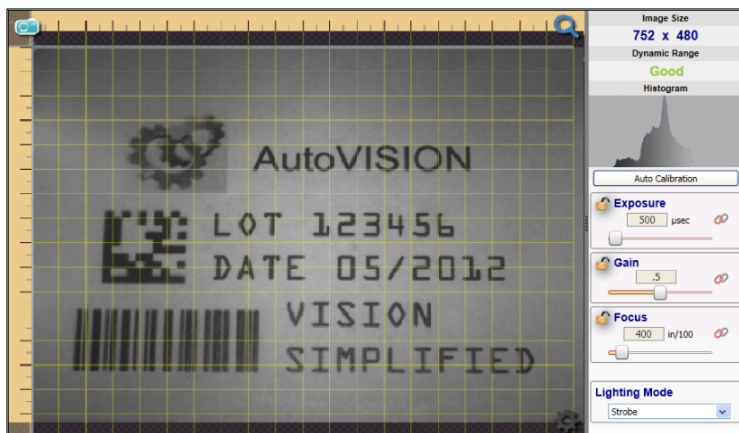
Show Rulers: Places rulers (in pixels) above and to the left of the image area.

Auto Calibration

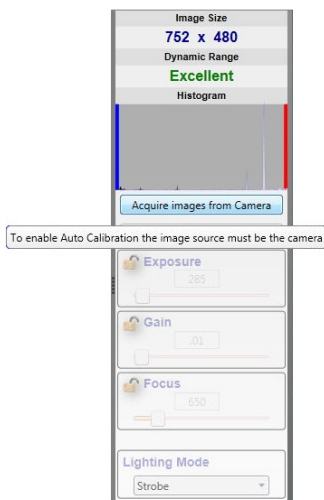
To perform **Auto Calibration**, click the Auto Calibrate button to the right of the main image area. AutoVISION performs a quick calibration on the image in the field of view and provides output on **Image Size** and **Dynamic Range**, and also provides a **Histogram**.

You can also adjust **Exposure**, **Gain**, and **Focus** individually, and set the **Lighting Mode**, as discussed in [Image Overview](#).

Important: The Vision HAWK C-Mount supports Exposure and Gain calibration, but not Focus calibration. **Auto Calibration** does not adjust Focus in the Vision HAWK C-Mount, and the Focus setting is hidden when the Vision HAWK C-Mount is connected.

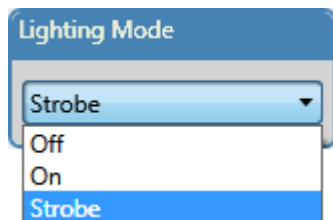


Important: The image source must be the camera for these controls to be enabled. If you see the **Acquire Images from Camera** button instead of the **Auto Calibration** button, click it to make the camera the image source and capture an image. The **Auto Calibration** button and other controls will then be enabled.



Lighting Mode

There are three lighting modes for the Vision HAWK and Vision MINI: **Off**, **On**, and **Strobe**.



Note: The Vision HAWK C-Mount does not have internal lighting, but does support external light control via **Output 3**.

When Lighting is set to **Off**, external lighting is disabled, and internal lighting (standard Vision HAWK and Vision MINI) is turned off. This is the default state for the Vision HAWK C-Mount.

When Lighting is set to **On**, external lighting is enabled (Output 3 of the Vision HAWK C-Mount is placed in a de-energized or open state) and internal lighting (standard Vision HAWK and Vision MINI) is enabled.

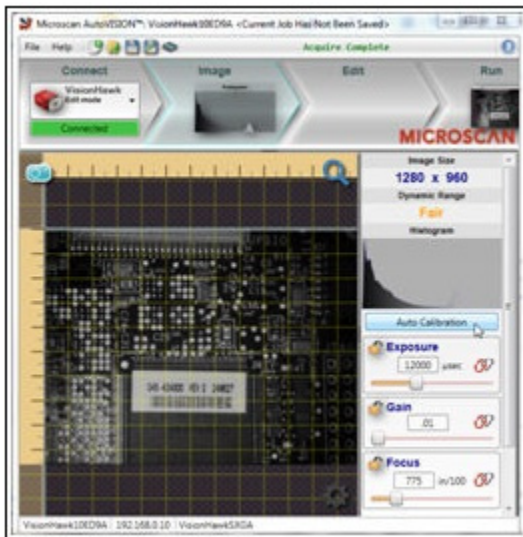
When Lighting is set to **Strobe**, Output 3 on the Vision HAWK C-Mount is enabled to control an external light. The normal state for Output 3 in this configuration is in an energized or closed state. At the start of an image acquisition the output is de-energized or placed in an open state. At the end of the camera's exposure period, the output is set back to a closed state.

Strobe is the default state for the standard Vision HAWK and Vision MINI.

Strobe operation allows you to connect the appropriate NERLITE external lighting product for your application and to control that light in sync with image acquisition. The light can be switched on fast enough that it is at full brightness before the exposure begins.

What Is Calibration?

In general purpose machine vision where various kinds of gauging are required, the term **Calibration** means the methodology for relating measurements made in pixels to practical real-world units, while at the same time making sure that the resulting measurement is as accurate as possible. In AutoVISION this is achieved by clicking the **Auto Calibration** button or by pressing the **AutoVISION button** on the camera. The calibration process transforms measurements made in pixels to accurate results in physical dimensional units (such as millimeters, inches, or microns).



The **Auto Calibration** button in AutoVISION's **Image** view performs a quick dimensional calibration on the image.

The Vision HAWK and Vision MINI both feature an **AutoVISION button**, which can be pressed to perform a quick dimensional calibration.



4 *Edit*

Contents

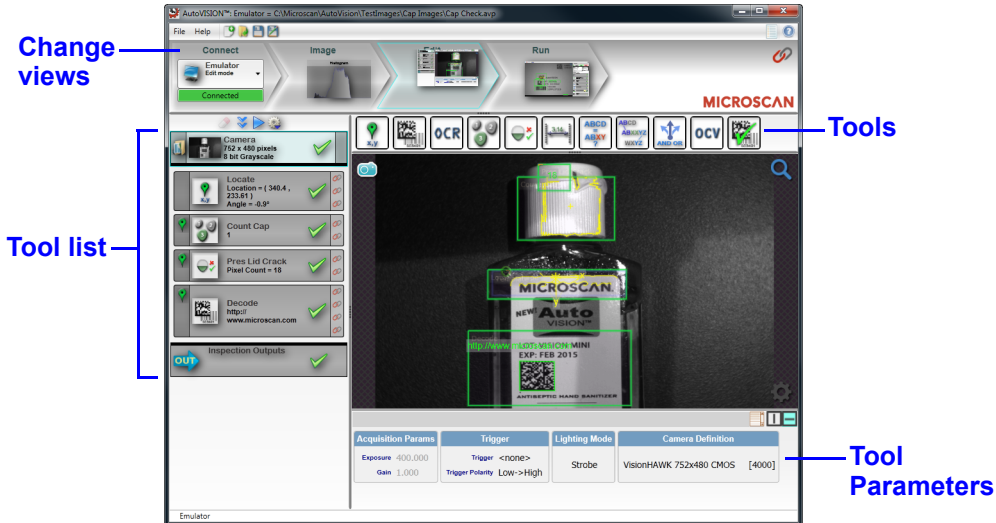
Edit Overview	4-2
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This section describes AutoVISION's Edit interface, and explains how to use AutoVISION Tools.

Edit Overview

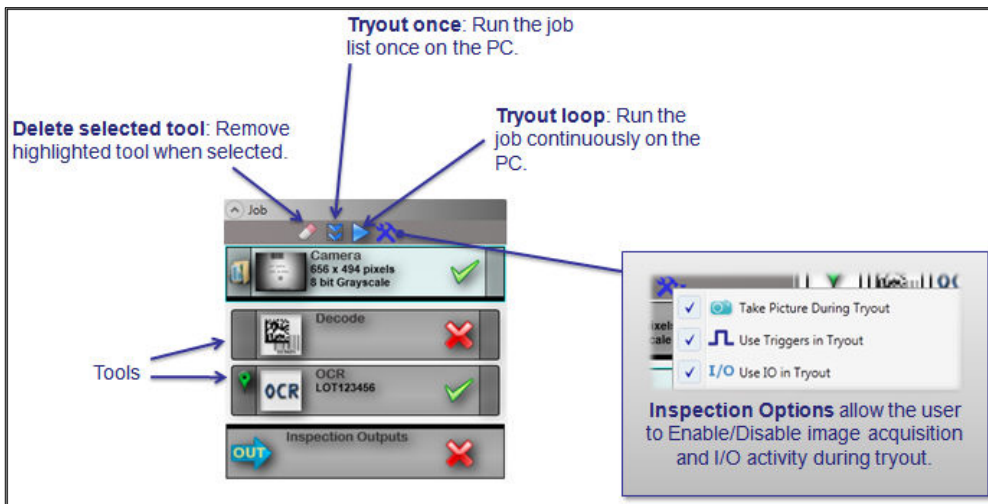
The **Edit** view allows you to edit and try out a job.

Hint: Right-click in the image area and move the mouse to drag the image to the desired position. Use the mouse wheel to zoom the image in or out.



Job List

The **Job List** displays all tools and represents the order of execution of tool functions. It also displays tool status and data.



Tools shown in the job list provide information about the current job.

Note: The **Camera** and **Inspection Outputs** tools are fixed and cannot be moved from their locations via drag-and-drop.

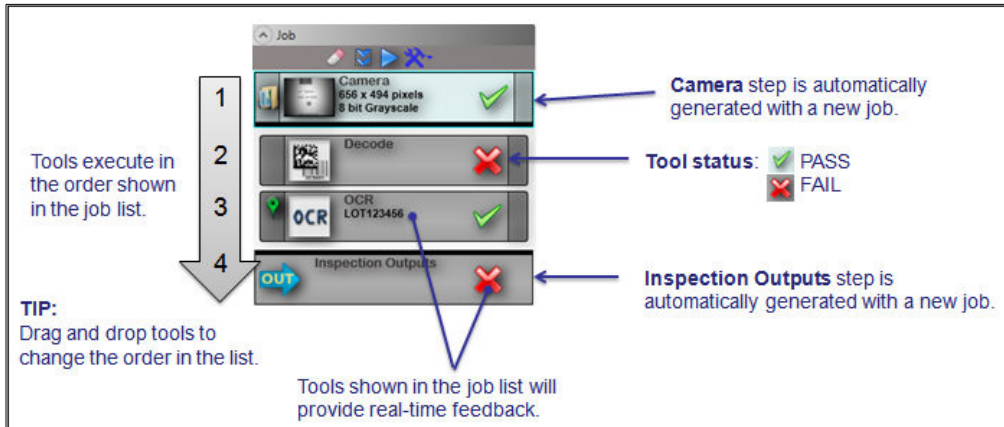


Image Area

The **Image Area** displays the current image, tool data, and controls for image adjustment.

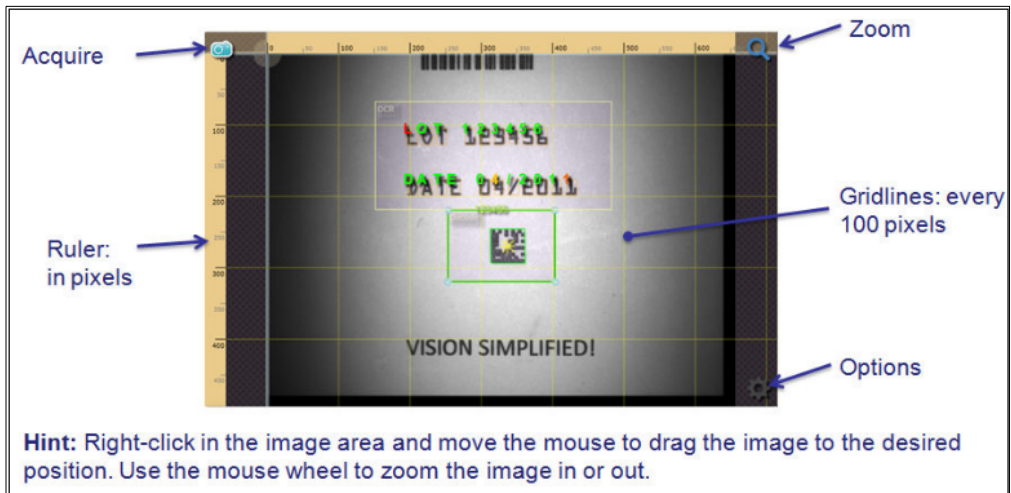
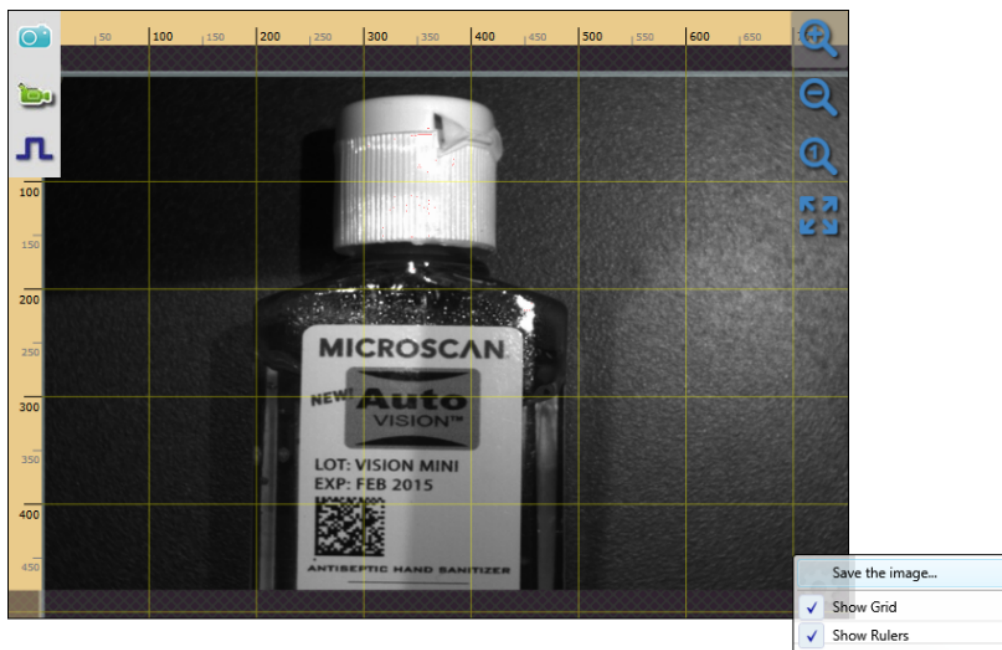


Image Control Tools



Acquire

Acquire Single Image: Takes a single picture.



Acquire Live Images: Live video used for camera and part adjustment.



Enable or Disable Trigger for Image Acquisition: When checked, and your camera has a trigger assigned, Acquire, Live Video and Tryouts will all wait for a trigger before acquiring an image.



Zoom

Zoom In: Makes the image appear larger.



Zoom Out: Makes the image appear smaller.



Actual Size: Shows the image at actual size in pixels.



Fit to Screen: Fits the image to the boundaries of the image area.



Options



Save the image...: Saves the captured image on the PC.

Show Grid: Places grid lines on the image for reference and measurement in pixels.

Show Rulers: Places rulers (in pixels) above and to the left of the image area.

Tools Overview

The tool icons are located above the main view area.



The following sections describe how to add and configure tools.

Adding Tools

The tool icons are located above the image area.

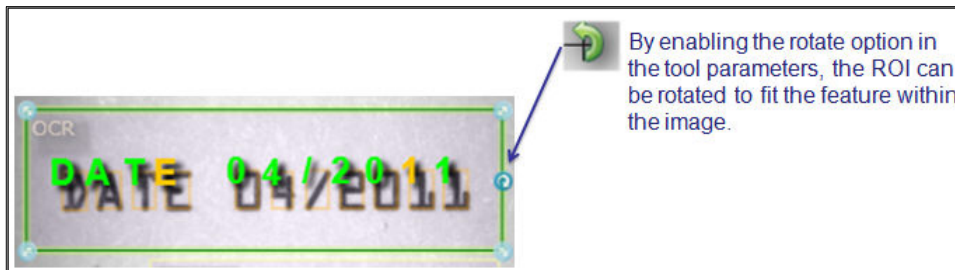
There are two ways to add a tool to a captured image:

1. Click on the tool icon.
2. Click and drag a tool icon into the image area, then adjust the region of interest (ROI) by grabbing one of the ROI's four anchor points and sizing the ROI as needed.



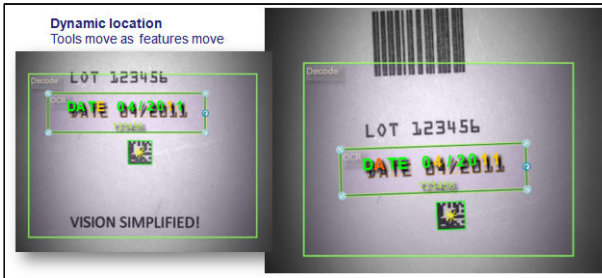
Region of Interest (ROI)

- All AutoVISION tools have an ROI except **Match Strings**, **String Format**, and **Logic**.
- A tool will only execute its function within its own ROI.
- Larger ROIs require more processing time.
- ROIs of different tools can overlap and still function correctly.
- Some ROIs can rotate.



Dynamic Locate

The **Locate Tool** and **Decode Tool** can be used to locate other tools dynamically, because they report coordinates within the image.



Using Dynamic Locate in the Locate Tool

Once a tool has been set as a location source, other tools can move with it.

Locate
Location =
X=281.937714
Y=210.968536
Angle=0.1

Count = 8

ON: Move this tool based on the coordinates reported by the Locate Tool.

OFF: Do not move this tool based on the coordinates reported by the Locate Tool.

Use the Locate Tool as a location source for other tools.

Locate Parameters

Quick Find ☒

Fit Quality Precise

Accept Threshold 0.800

Allowed Rotation (± Degrees)

180

Using Dynamic Locate in the Decode Tool

Use this tool as a location source for other tools.

Symbology Types

Data Matrix ECC200

QR Code 2005

Code 39

Code 128

I2-5

UPC/EAN

Camera

Camera parameters can be used to set up image acquisition.

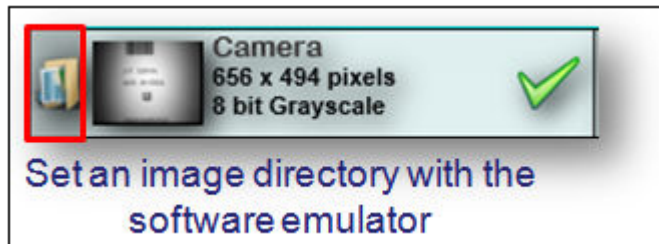
Acquisition Params	
Exposure	400.000
Gain	1.000
Focus	400

Trigger	
Trigger	<none>
Trigger Polarity	Low->High

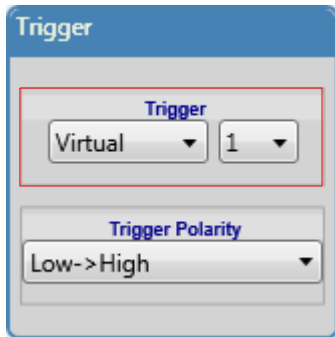
Lighting Mode	
Off	

Camera Definition	
VisionHAWK 752x480 CMOS	[4000]

- When connected to a smart camera, adjust camera-specific settings such as **Exposure**, **Gain**, **Focus**, **Trigger**, and **Lighting Mode**.
- When using the Emulator, select your image file location on the PC, and use the **Camera Definition** menu to select which smart camera and resolution to emulate.



Trigger



- Use the **Trigger** dropdown menu to adjust trigger input settings.

None: Continuous operation; no trigger defined.

Digital: Select from available digital inputs on the camera.

Virtual: Select virtual triggers 1 through 10.

Sensor: The sensor input of the camera will trigger.

Serial Trigger: A programmable serial command can be sent over a programmable port. The text field to the right of the Trigger dropdown menu accepts the following special non-printable characters:

\a bell

\b backspace

\f form feed

\n new line

\r carriage return

\t horizontal tab

\v vertical tab

\' single quote

\" double quote

\? question mark

\ooo three digit octal notation ASCII value, i.e. \145 = 'e'

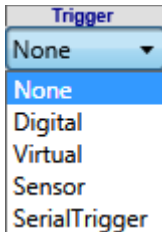
\xhh hexadecimal notation ASCII value, i.e. \x4C = 'L'

Force Trigger

When a trigger is selected and **Wait for Triggers During Acquire and Tryout** is selected, the **Force Trigger** button will appear above the Navigator Bar. This allows you to trigger the camera to acquire images and advance the Tryout Loop.

Important: Triggering from AutoVISION is intended for testing only and results in significant processing time variation. Use the actual trigger source for actual timing values.

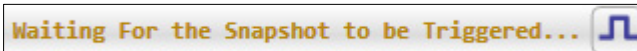
Trigger Dropdown Menu



Wait for Triggers During Acquire and Tryout

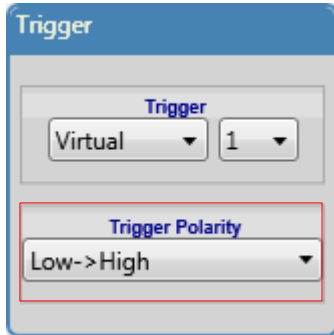


Force Trigger Button



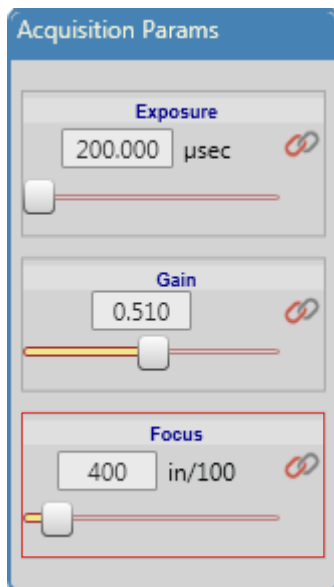
Trigger Polarity

Trigger Polarity allows you to set whether the trigger is **Low > High** or **High > Low**.



Focus

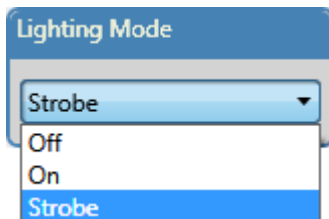
The **Focus** control slider allows you to set the focus of the Vision HAWK or Vision MINI's built-in lens system.



The Vision HAWK C-Mount product does not support this focus control, because the lens is focused manually and there is no built-in lens system to adjust. The Focus control slider is hidden when a Vision HAWK C-Mount is connected.

Lighting

There are three lighting modes for the Vision HAWK and Vision MINI: **Off**, **On**, and **Strobe**.



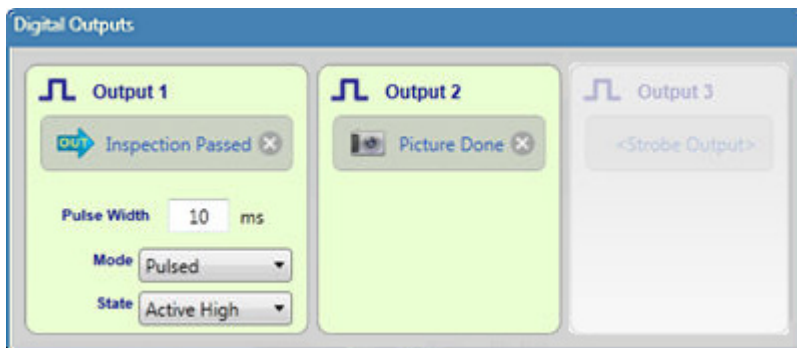
Note: The Vision HAWK C-Mount does not have internal lighting, but does support external light control via **Output 3**.

When Lighting is set to **Off**, external lighting is disabled, and internal lighting (standard Vision HAWK and Vision MINI) is turned off. This is the default state for the Vision HAWK C-Mount.

When Lighting is set to **On**, external lighting is enabled (Output 3 of the Vision HAWK C-Mount is placed in a de-energized or open state) and internal lighting (standard Vision HAWK and Vision MINI) is enabled.

When Lighting is set to **Strobe**, Output 3 on the Vision HAWK C-Mount is enabled to control an external light. The normal state for Output 3 in this configuration is in an energized or closed state. At the start of an image acquisition the output is de-energized or placed in an open state. At the end of the camera's exposure period, the output is set back to a closed state.

If the Vision HAWK C-Mount contains a job in which the camera's Lighting parameter is set to **Strobe**, Output 3 becomes fixed as an external strobe signal. This means that Output 3 can no longer be used as a general purpose output, and will therefore be disabled. Output 3 in the **Digital Outputs** editor will not be available, as shown in the example below. Note that the connection area of Output 3 says "Strobe Output" to provide feedback as to why Output 3 is disabled.

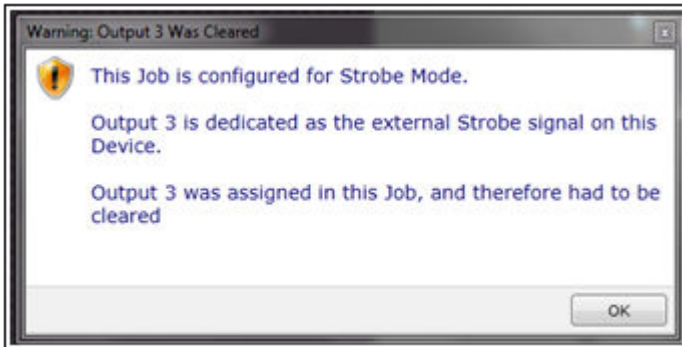


Strobe is the default state for the standard Vision HAWK and Vision MINI.

Strobe operation also allows you to connect the appropriate NERLITE external lighting product for your application and to control that light in sync with image acquisition. The light can be switched on fast enough that it is at full brightness before the exposure begins.

Notes on Vision HAWK C-Mount Output 3

- If Output 3 is already connected and the Lighting parameter is changed to Strobe, Output 3 will be disconnected and then disabled.
- If a job is created on a standard Vision HAWK in which Output 3 is assigned and the Lighting parameter is set to Strobe, and then that job is loaded onto a Vision HAWK C-Mount, a warning will appear stating that Output 3 must be disconnected:

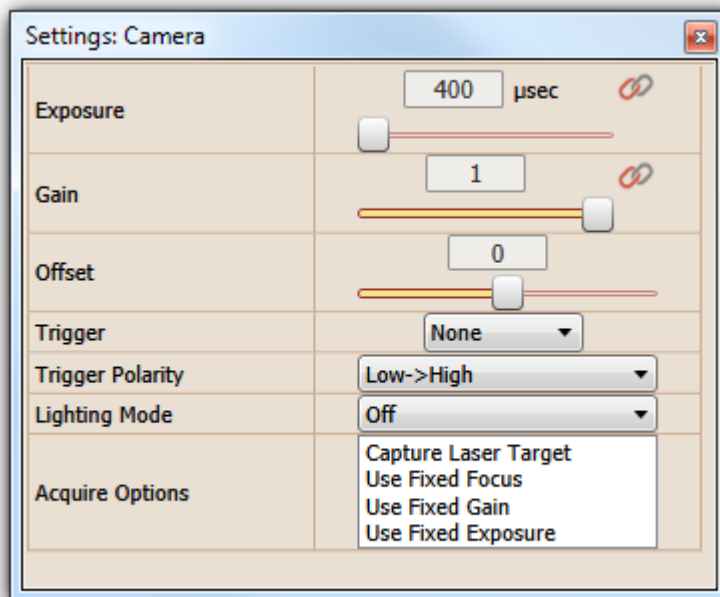


Camera Advanced Parameters

Click the Advanced Parameters icon at the upper right of the Edit view to access **Camera Advanced Parameters**.



- **Exposure:** Allows you to set the integration time for the camera's image sensor pixels.
- **Gain:** Allows you to set the signal strength applied to pixel grayscale values prior to output.
- **Offset:** Allows you to set the level of digital offset to apply to the output signal to adjust the dark level. This provides a means for adjusting the dark level if clipping of the dark signal is occurring (dark value below 0) to provide more contrast.
- **Trigger:** Selects the type of I/O.
- **Trigger Polarity:** Defines whether trigger polarity is Low-to-High or High-to-Low.
- **Lighting Mode:** Selects how the camera's built-in lighting is configured.
- **Acquire Options:** Allows you to enable a capture target or to use fixed photometry values.

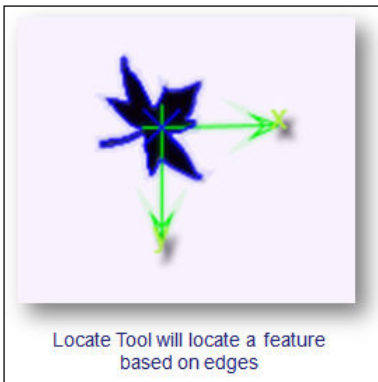


Locate Tool



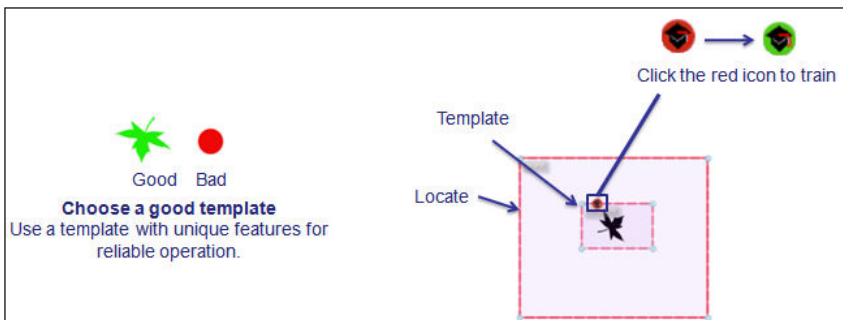
The **Locate Tool** dynamically locates a learned pattern within a captured image. This tool:

- Learns a pattern based on edges.
- Reports X, Y, and Theta (rotation) coordinates of the edge pattern.
- Reports feature coordinates to locate other tools.
- Has a template ROI (region of interest) and a locate ROI.
- Can also be used for presence/absence inspection.



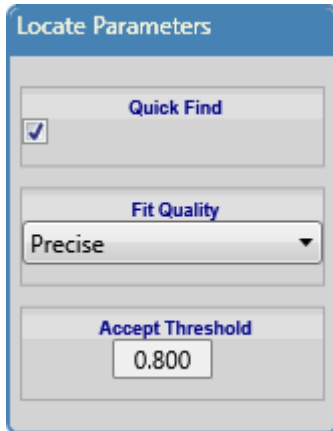
Setting Up the Locate Tool

- Add the **Locate Tool** to the image area.
- Adjust the **template ROI** around the feature that you want the tool to learn.
- Adjust the **locate ROI** to cover the area within which you expect your feature to move from image to image.
- Train the tool to recognize the pattern by clicking the **Train** icon.



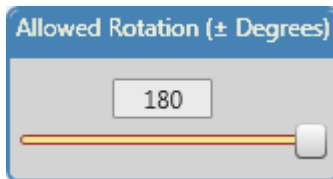
Locate Tool Parameters

- **Quick Find:** Uses a rough location. Faster but less accurate.
- **Fit Quality:** Defines how closely the identified feature must match the template (Relaxed, Normal, Precise).
- **Accept Threshold:** A ratio that determines how well the located feature must match the trained feature. (0.1 – 1, where 1 = perfect match.)



The screenshot shows a dialog box titled "Locate Parameters". It contains three sections: "Quick Find" with a checked checkbox, "Fit Quality" with a dropdown menu set to "Precise", and "Accept Threshold" with a text box containing "0.800".

- **Allowed Rotation:** Sets a limit on how much the object can rotate and still be recognized.



The screenshot shows a slider control titled "Allowed Rotation (± Degrees)". The slider has a range from 0 to 360 degrees, with a current value of 180 degrees indicated by a red line and a slider knob.

Hint: The **Locate Tool** is configured to handle 360 degrees of rotation by default. However, reducing the **Allowed Rotation (± Degrees)** will speed up the tool's performance considerably.

Locate Tool Outputs

- **Status:** Pass/Fail
- **Location:** X, Y, Theta (rotation), scale

Locate Tool Advanced Parameters

Click the **Advanced Parameters** icon at the upper right of the **Edit** view to access **Locate Tool Advanced Parameters**.



- **Effort Level:** Determines how hard the tool should work to locate the feature. Increasing the effort level slows down the inspection.
- **Positioning Accuracy:** Determines the precision with which the location of the feature is reported.

Enable Scale Search: When enabled, features can still be located if they change in size from image to image.

Note: Setting the Allowed Rotation of the Locate Tool to any value between 0-5° enables **Scale Search**. Setting Allowed Rotation to any value between 6-180° disables **Scale Search**.

- **Minimum Scale:** Sets the minimum scale change that is allowed between the located feature and the trained feature. For example, 2 signifies that half the trained size is acceptable.
- **Maximum Scale:** Sets the maximum scale change that is allowed between the located feature and the trained feature. For example, 0.5 signifies that half the trained size is acceptable.
- **Conformity Tolerance:** Determines how tolerant of distortion the tool is. Increase this value to allow more distorted features to be located.

Important: Before the Locate Tool is trained on a feature, the Conformity Tolerance for **Relaxed Fit Quality** is **14.000**, **Normal** is **10.000**, and **Precise** is **6.000**. After the tool is trained, **Relaxed Fit Quality** is **10.000**, **Normal** is **6.000**, and **Precise** is **2.000**.

- **Min % of Model Match:** Sets the minimum percentage of the trained model that must match a feature for that feature to be located.
- **Model Name (read only):** The name that is assigned to the contour file for the tool. The contour file is saved in \Microscan\Vscape\Jobs\Contours.

All Settings: Locate Shape1	
Effort Level	Normal
Positioning Accuracy	Normal
Enable Scale Search	<input checked="" type="checkbox"/>
Minimum Scale	0.850
Maximum Scale	1.150
Conformity Tolerance	6.000
Min % of Model Match	50
Model Name (read only)	Model3

Decode Tool

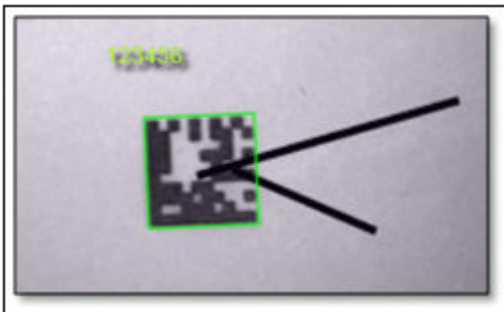


The **Decode Tool** uses Microscan's aggressive X-Mode algorithms to decode 1D and 2D symbols. Up to 100 symbols can be decoded in a single region of interest. The Decode Tool also features a **Match String** function that allows you to compare data output from multiple symbols.

The Decode Tool supports the following:

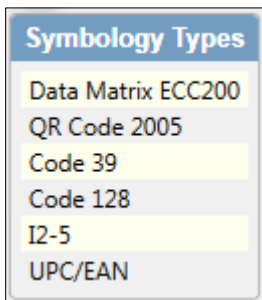


The Decode Tool can read damaged or obstructed symbols as in the example below.

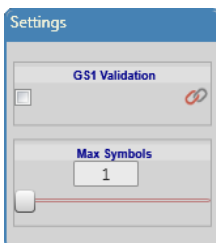


Decode Tool Parameters

- Adjust ROI to at least 2 times the symbol size.
- Leave at least 2x the symbol's element size between the ROI and the symbol.
- Disable unused symbologies to reduce decode times.



- Set the maximum number of symbols as needed.



- Enter the Match String value if required.

Decode Tool Match String

Match String allows you to compare two output strings from two different kinds of tools, or two of the same kind of tool.

The Match String function for the Decode Tool allows you to enter a '?' character as a wildcard character. Match String for the Decode Tool does not support special characters.

Non-Printable Characters

When a decoded symbol contains non-printable characters, the Match String can accept hexadecimal escape codes. These are of the form **\xFF**, where **FF** represents two hexadecimal digits. The "x" and the hex digits are not case sensitive.

To be processed, the escape sequence must be fully formed; otherwise it is treated as if it were not an escape sequence.

For example, to match ABCD<cr>EFG, where <cr> is a carriage return (hex 0D), set Match String to:

ABCD\x0DEFG

Using a serial command, this would be:

SET matchstring1 ABCD\x0DEFG

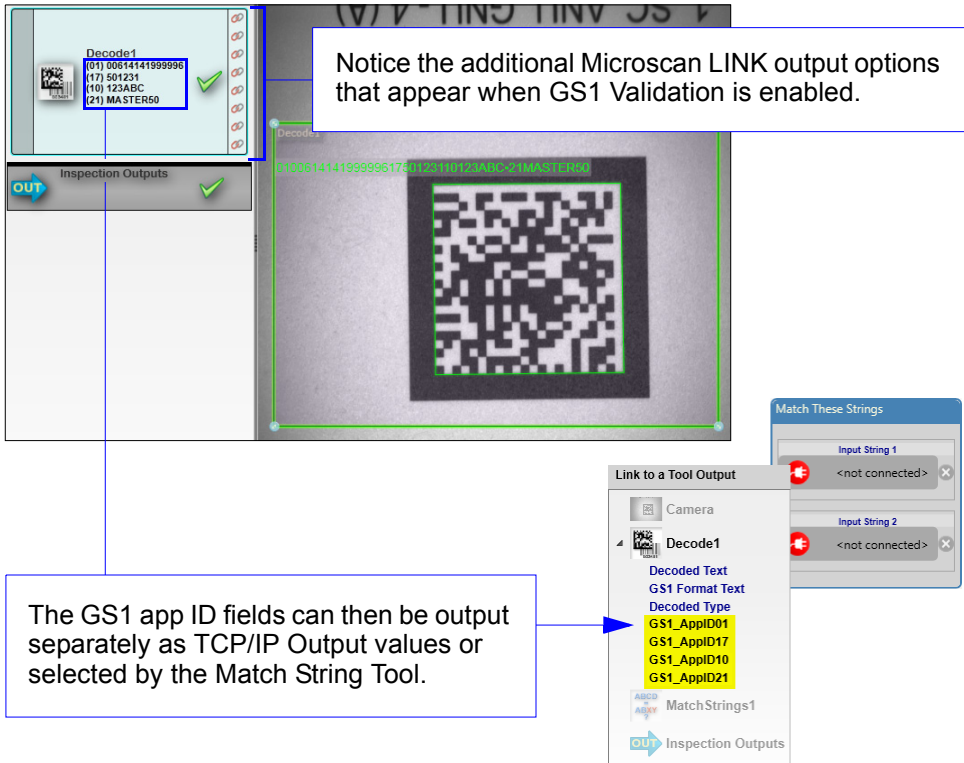
GS1 Validation

GS1 Validation allows you to output separate GS1 application identifiers (such as GTIN, batch or lot number, expiration date, and serial number). GS1 Validation also checks the syntax of the symbol for conformance to the GS1 standard.

To enable GS1 Validation, click the GS1 Validation box in the Decode Tool Settings editor.



The example below shows the Decode Tool's output broken into individual GS1 app IDs.



Decode Tool Outputs

- **Status:** Pass/Fail
- **Decoded Text**
- **GS1 Format Text**
- **Symbology Type**
- **Location**

Decode Tool Advanced Parameters

Click the **Advanced Parameters** icon at the upper right of the **Edit** view to access **Decode Tool Advanced Parameters**.



- **Symbology Types:** Allows you to determine which symbologies are enabled (blue) or disabled (white).
- **Match String Enable:** Enables or disables Decode Tool results for Match String output.
- **Match String:** Allows you to specify the string that must be matched for the Decode Tool to pass. This parameter can be linked to the string data type.
- **Wildcard Character:** Enables or disables a wildcard character in Decode Tool output.
- **Max Symbols:** Determines the maximum number of symbols to decode in a single Decode Tool ROI. This parameter can be linked to the int and long data types.
- **GS1 Validation:** Allows you to extract, validate, and output separate symbol data fields.
- **Timeout (ms):** Determines the maximum amount of time (1 ms to 10,000 ms) the Decode Tool will spend processing an image.
- **Code 128 Fixed Symbol Length Status:** When enabled, outputs status of Fixed Symbol Length along with symbol data.
- **Code 128 Symbol Length:** Allows you to set the Code 128 Symbol Length.
- **Code 128 EAN Status:** When enabled, outputs EAN Status along with symbol data.
- **Code 128 Output Format:** Allows you to set Code 128 Output Format to Standard or Application.
- **Code 128 Application Record Separator Status:** When enabled, outputs the status of the Application Record Separator along with symbol data.
- **Code 128 Application Record Separator Character:** Allows you to set the separator character for Application Records.
- **Code 128 Application Record Brackets Status:** When enabled, outputs Application Record Brackets status along with symbol data.
- **Code 128 Application Record Padding Status:** When enabled, outputs Application Record Padding status along with symbol data.
- **Code 39 Check Character Status:** When enabled, outputs the status of the Check Character along with symbol data.
- **Code 39 Check Character Output Status:** When enabled, outputs the status of Check Character Output along with symbol data.
- **Code 39 Large Intercharacter Gap Status:** When enabled, outputs the status of Large Intercharacter Gap along with symbol data.
- **Code 39 Fixed Symbol Length Status:** When enabled, outputs the status of Fixed Symbol Length along with symbol data.
- **Code 39 Symbol Length:** Allows you to set the Code 39 Symbol Length.
- **Code 39 Full ASCII Set Status:** When enabled, outputs the status of Full ASCII Set along with symbol data.

- **Interleaved 2 of 5 Check Character Status:** When enabled, outputs the status of the Check Character along with symbol data.
- **Interleaved 2 of 5 Check Character Output Status:** When enabled, outputs the status of Check Character Output along with symbol data.
- **Interleaved 2 of 5 Symbol Length 1:** Allows you to set Symbol Length 1 for Interleaved 2 of 5.
- **Interleaved 2 of 5 Symbol Length 2:** Allows you to set Symbol Length 2 for Interleaved 2 of 5.
- **Interleaved 2 of 5 Guard Bar Status:** When enabled, outputs the status of Guard Bar along with symbol data.
- **Interleaved 2 of 5 Range Mode Status:** When enabled, outputs the status of Range Mode along with symbol data.
- **UPC/EAN Status:** When enabled, outputs UPC/EAN status along with symbol data.
- **UPC/EAN Supplementals Status:** When enabled or required, outputs the status of UPC/EAN Supplementals along with symbol data.
- **UPC/EAN Separator Status:** When enabled, outputs the status of the UPC/EAN Separator along with symbol data.
- **UPC/EAN Separator Character:** Allows you to set the separator character for UPC/EAN output.
- **UPC/EAN Supplementals Type:** Allows you to set the UPC Supplementals Type (Both, 2 Digits, or 5 Digits).
- **UPC/EAN UPC-E as UPC-A Status:** When enabled, outputs the status of UPC-E outputs as UPC-A.
- **Auto Teach Options:** When **Train Step** is selected and the **New Master pin** is toggled, the software will learn the data that has just been decoded. It will also learn the symbol's background color, element size, symbology, and various other characteristics. This allows the software to process future instances of the same symbol more quickly.

When **Learn Match String** is selected and the New Master pin is toggled, the software will set the data that has just been decoded as the Match String.

The **AutoVISION button** on the Vision HAWK and Vision MINI can also be used to set Teach input. Hold the AutoVISION Button down until you see three LED flashes, releasing the button after the third flash. Match String will be set to the symbol that is decoded on the next run cycle.

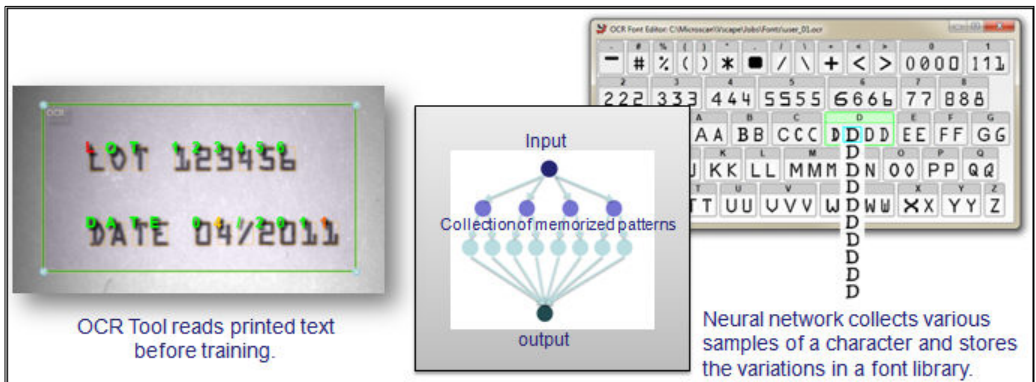
De-select all Auto Teach Options in AutoVISION if you want nothing to occur when the New Master pin is toggled.

OCR Tool



The **OCR Tool** reads printed text and translates it to ASCII text. This tool:

- Reads multiple lines of text in a single ROI.
- Features pre-loaded OCR fonts that are designed to be read without the need for training.
- Features user-trained fonts for more robust character recognition.
- Uses a neural network model for greater variation allowance.



OCR Tool Parameters

The screenshot shows a vertical stack of controls. At the top is a blue header 'Font Selection'. Below it is a 'Current Font' dropdown menu showing 'AV DEFAULT', with 'Font Editor...' and 'New Font...' buttons. The next section is 'Confidence' with a text field showing '0.500'. Below that is 'Char Selection' with 'Auto Size' checked, 'Width' set to 19, 'Height' set to 18, and 'Connection Strength' set to 0. At the bottom is a blue 'Match String' button.

- **Font Selection:** Select the font to use, create a new font, or edit the current font library. New fonts are created from existing font libraries.
- **Confidence:** Specify the minimum level of confidence required before a character will be read.
- **Character Selection:** Specify the width and height of a character (in pixels) or use **Auto Size**.

Hint: Disable Auto Size for more reliable reading.

Connection Strength helps correct for characters that are either touching or are formed by individual dots such as those produced by a dot peen stylus or inkjet printing.

This parameter ranges from **-3** (AutoVISION will search for characters that are underprinted or not touching) to **3** (AutoVISION will search for characters that are overprinted or touching).

When set to **0**, AutoVISION does not perform any pre-processing (multiple passes of an "erode" function for -3, -2, and -1 or multiple passes of a "dilate" function for 1, 2, and 3), so processing time will be decreased.

- **Match String:** Requires the OCR string to match the Match String value defined by the user.
- **Enable Rotation**



OCR Tool Match String

Match String allows you to compare two output strings from two different kinds of tools, or two of the same kind of tool.

The Match String function for the OCR Tool allows you to enter a '?' character as a wildcard character. Match String for the OCR Tool does not support special characters.

Non-Printable Characters

When a decoded symbol contains non-printable characters, the Match String can accept hexadecimal escape codes. These are of the form \xFF, where FF represents two hexadecimal digits. The "x" and the hex digits are not case sensitive.

To be processed, the escape sequence must be fully formed; otherwise it is treated as if it were not an escape sequence.

For example, to match ABCD<cr>EFG, where <cr> is a carriage return (hex 0D), set Match String to:

ABCD\x0DEFG

Using a serial command, this would be:

SET matchstring1 ABCD\x0DEFG

OCR Tool Outputs

- **Status:** Pass/Fail
- **Text String**

OCR Confidence

- The decoded ASCII text is placed over the printed text in the image.
- The color of the ASCII text character represents the confidence level with which it was recognized.

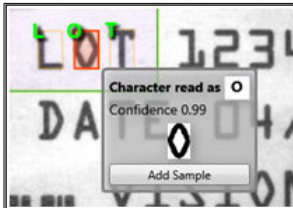
- **Green:** ~80 – 100%

- **Orange:** ~60 – 79%

- **Red:** < 60%

- Click on any character to:
 - View confidence level
 - Add a sample to the character library
 - View a reference image

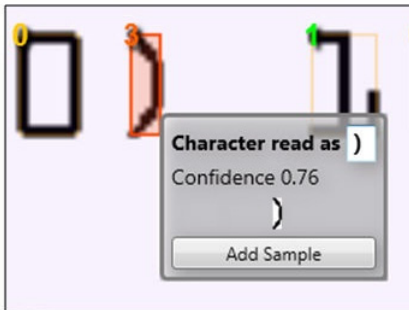
When a sample is added to the library, the original image is modified, and variations of the character are also added.



Adding New Characters and Fonts

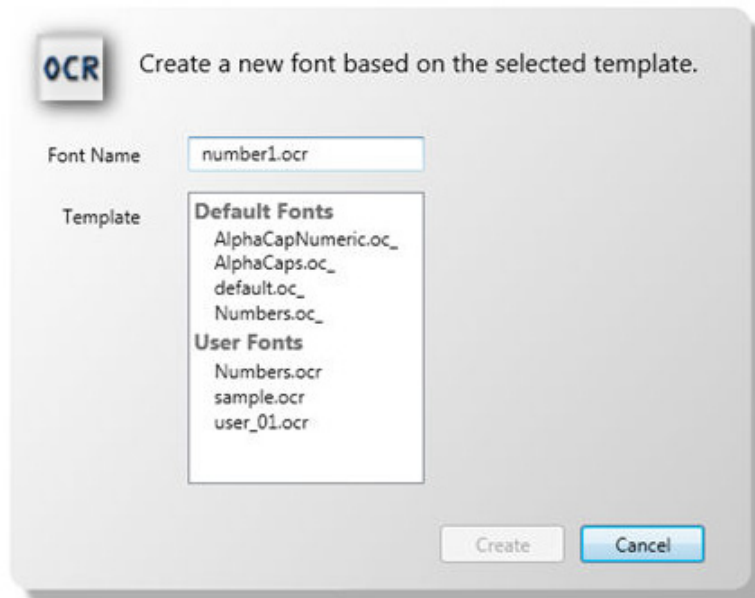
When adding a new font to AutoVISION's font library, it is only necessary to include the characters that will be used. The new characters will be added to a new font based on an existing font.

For example, if you want to add parentheses to a number library so that parentheses will be identified correctly, right-click on the character that you want to add to the library, enter it in the **Character read as** text field, and then click the **Add Sample** button.



New ("user") fonts are based on existing ("default") fonts. Fonts can be named by clicking the **New Font** button and then entering the new font name in the **Font Name** text field.

New Font



OCR Font Editor

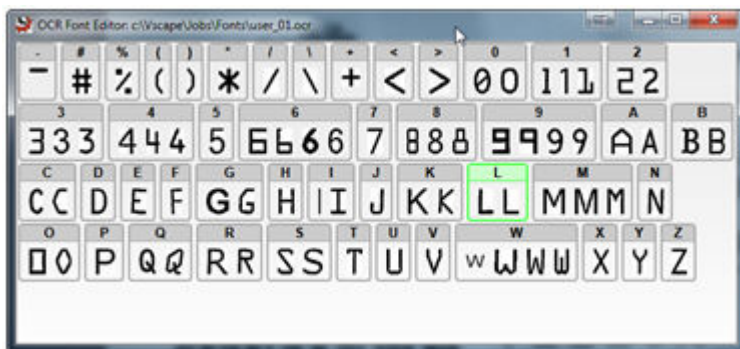
The **OCR Font Editor** allows you to:

- View a character set
- Remove trained samples
- View default sample set characters
- View user-defined characters

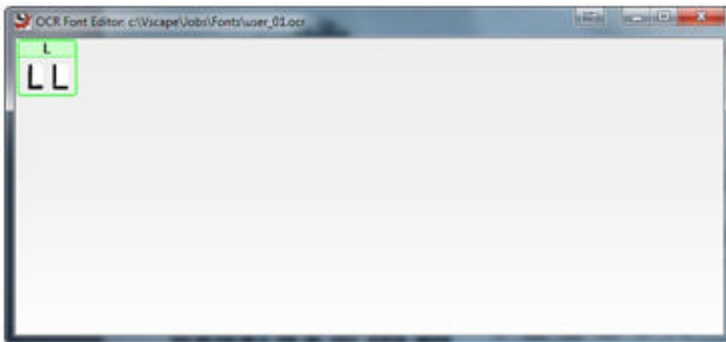
Click the **Font Editor** button in the OCR tool parameters to bring up the Font Editor.

Font Editor

Default characters are highlighted in gray, and user-trained characters are highlighted in green.



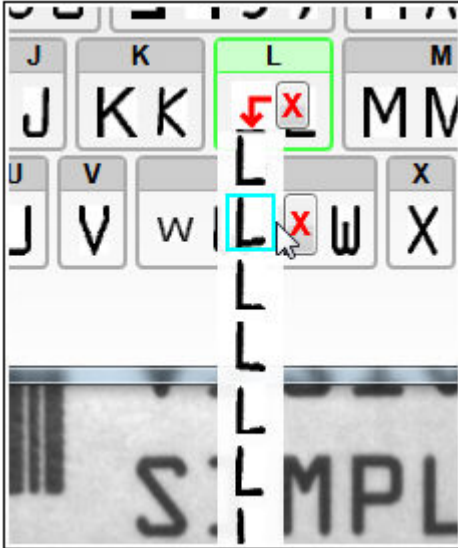
When "Use Default Font" is unchecked in OCR Advanced Parameters, the Font Editor shows only user-trained characters.



Removing Multiple Character Samples Simultaneously for User-Trained Characters

When you train a new OCR character, multiple samples are added to the font library. If you add a new character accidentally, you can remove all user-trained samples for that character simultaneously.

Hovering over the first character position in a font entry shows the popup list of trained symbols. A red "X" button will appear at the top of the column of symbols. Pressing this button will remove all the user-trained data from the selected character.



OCR Tool Advanced Parameters

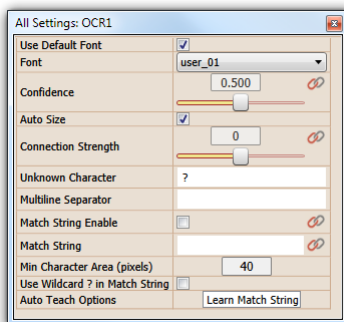
Click the **Advanced Parameters** icon at the upper right of the **Edit** view to access **OCR Tool Advanced Parameters**.



- **Use Default Font:** When checked, the full character set for the selected font is shown in the Font Editor.
- **Font:** This dropdown menu allows you to set which font the OCR Tool will use.
- **Confidence:** Determines the required confidence with which text is recognized before it will be output.
- **Auto Size:** Automatically determines the size of OCR output text.
- **Connection Strength:** Determines the required connection strength for text to be read.
- **Unknown Character:** Allows you to set what the OCR Tool will output when a character is not recognized.
- **Multiline Separator:** Allows you to determine the character that will be used as a separator for multiline OCR output.
- **Match String Enable:** Enables or disables Match String output for the OCR Tool.
- **Match String:** Allows you to specify the string that must be matched for an OCR inspection to pass.
- **Min Character Area (pixels):** Allows you to determine the minimum size in pixels of the area in which a given character is located.
- **Use Wildcard ? in Match String:** Sets the wildcard character to '?' for Match String.
- **Auto Teach Options:** When **Learn Match String** is selected and the **New Master pin** is toggled, the software will set the OCR string that has just been decoded as the Match String.

The **AutoVISION button** on the Vision HAWK and Vision MINI can also be used to set Teach input. Hold the AutoVISION Button down until you see three LED flashes, releasing the button after the third flash. Match String will be set to the OCR string that is decoded on the next run cycle.

Note: De-select Auto Teach Options if you want nothing to occur when the New Master pin is toggled.

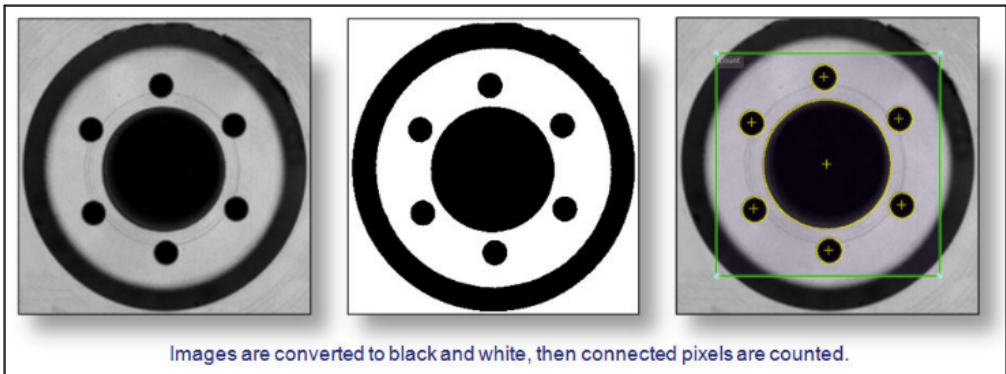


Count Tool

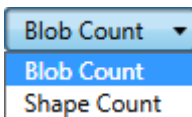


The **Count Tool** allows you to count the number of objects found within the region of interest. This tool counts areas of connected light or dark pixels. The Count Tool is ideal for:

- Verifying the correct number of parts in a tray.
- Verifying the correct number of holes in a part.
- Detecting and reporting the number of objects in the image.



The Count Tool has a **Blob Count** capability and a **Shape Count** capability. Select Blob Count or Shape Count from the dropdown menu above the tool parameters.

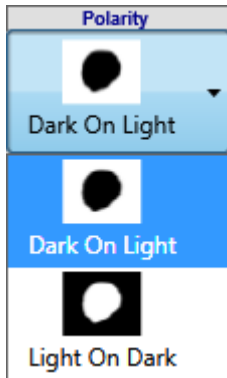


Important: When switching between Blob Count and Shape Count, the links between tool outputs and GDS tags are lost. This is because the underlying components that make up the Count Tool are completely removed and then recreated whenever you change the tool's capability.

Count Tool Parameters

Blob Count

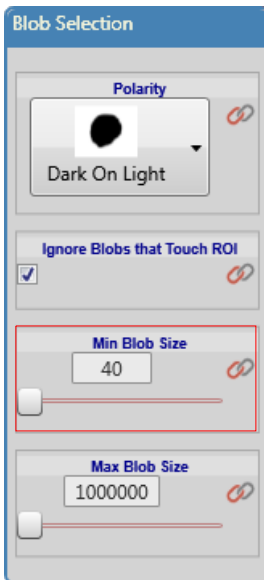
- **Polarity:** Determines whether to count objects that are either lighter or darker than the background.



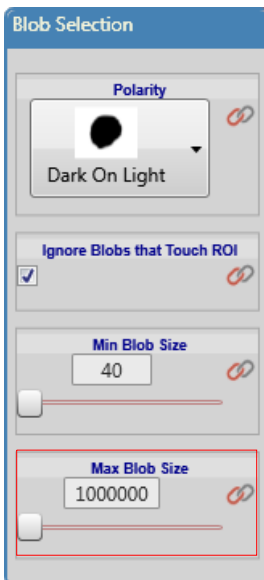
- **Ignore Blobs that Touch the ROI:** When enabled, blobs that touch the edge of the ROI will not be detected.



- **Min Blob Size:** Objects smaller than the defined size (in pixels) will be ignored.

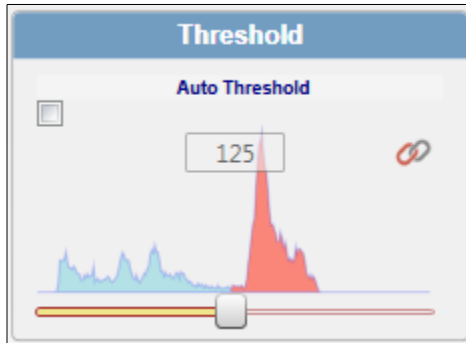


- **Max Blob Size:** Objects larger than the defined size (in pixels) will be ignored.

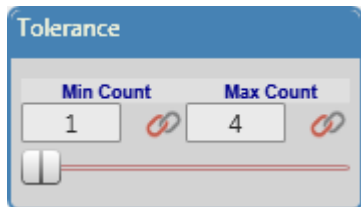


Count Tool

- **Threshold:** The Count Tool's Blob Count capability displays a histogram of the gray values within its region of interest. This provides a visual aide when setting the tool's threshold value. The histogram shows where the majority of the dark pixels (to the left) and the light pixels (to the right) are on the gray scale. You can use the slider to adjust the threshold to a point between the two peaks. The portion of the histogram that is above the threshold is displayed in red; the portion that is below the threshold is displayed in blue. Selecting **Auto Threshold** will instruct the software to compute the threshold automatically.



- **Tolerance:** Sets the tolerance on the minimum and maximum number of pixels allowable for the inspection to pass.

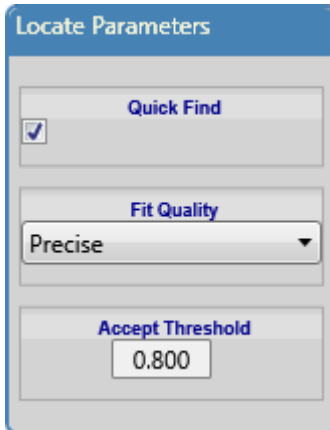


- **Enable ROI Rotation**



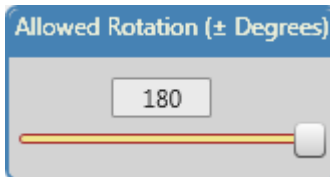
Shape Count

- **Quick Find:** Uses a rough location. Faster but less accurate.
- **Fit Quality:** Defines how closely the identified feature must match the template (Relaxed, Normal, Precise).
- **Accept Threshold:** A ratio that determines how well the located feature must match the trained feature. (0.1 – 1, where 1 = perfect match.)



The 'Locate Parameters' dialog box has a blue header. It contains three sections: 'Quick Find' with a checked checkbox, 'Fit Quality' with a dropdown menu set to 'Precise', and 'Accept Threshold' with a text box containing '0.800'.

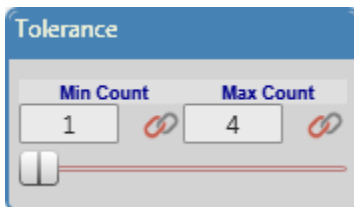
- **Allowed Rotation:** Sets a limit on how much the object can rotate and still be recognized.



The 'Allowed Rotation (± Degrees)' dialog box has a blue header. It features a text box with '180' and a slider bar below it.

Hint: The Count Tool is configured to handle 360 degrees of rotation by default. However, reducing the Allowed Rotation (± Degrees) will speed up the tool's performance considerably.

- **Tolerance:** Sets the tolerance on the minimum and maximum number of pixels allowable for the inspection to pass.



The 'Tolerance' dialog box has a blue header. It contains two text boxes labeled 'Min Count' (with value '1') and 'Max Count' (with value '4'). Each text box has a red chain-link icon to its right. Below these is a slider bar with two white handles.

Count Tool Outputs

- **Status:** Pass/Fail
- **Number of Parts**
- **Instance 1 Point**
- **Total Instances**
- **Instance 1 Fit Quality**

Count Tool Shape Count Advanced Parameters

Click the **Advanced Parameters** icon at the upper right of the **Edit** view to access **Count Tool Shape Count Advanced Parameters**.



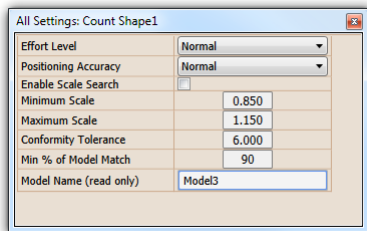
- **Effort Level:** Determines how hard the tool should work to locate the feature. Increasing the effort level slows down the inspection.
- **Positioning Accuracy:** Determines the precision with which the location of the feature is reported.
- **Enable Scale Search:** When enabled, features can still be located if they change in size from image to image.

Note: Setting the Allowed Rotation of the Count Tool (Shape Count) to any value between 0-5° enables **Scale Search**. Setting Allowed Rotation to any value between 6-180° disables **Scale Search**.

- **Minimum Scale:** Sets the minimum scale change that is allowed between the located feature and the trained feature. For example, 2 signifies that half the trained size is acceptable.
- **Maximum Scale:** Sets the maximum scale change that is allowed between the located feature and the trained feature. For example, 0.5 signifies that half the trained size is acceptable.
- **Conformity Tolerance:** Determines how tolerant of distortion the tool is. Increase this value to allow more distorted features to be located.

Important: Before Shape Count is trained on a feature, the Conformity Tolerance for **Relaxed Fit Quality** is **14.000**, **Normal** is **10.000**, and **Precise** is **6.000**. After the tool is trained, **Relaxed Fit Quality** is **10.000**, **Normal** is **6.000**, and **Precise** is **2.000**.

- **Min % of Model Match:** Sets the minimum percentage of the trained model that must match a feature for that feature to be located and counted.
- **Model Name (read only):** The name that is assigned to the contour file for the tool. The contour file is saved in \Microscan\Vscope\Jobs\Contours.

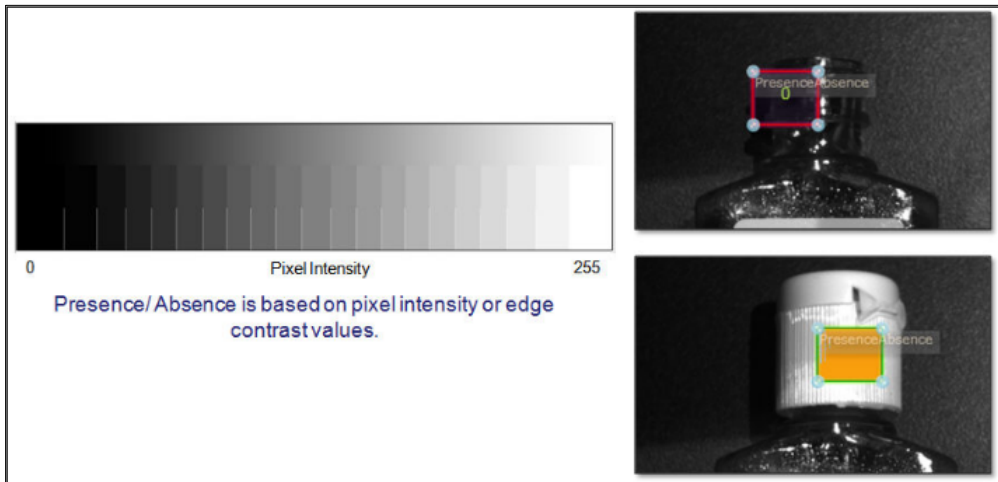


Presence/Absence Tool



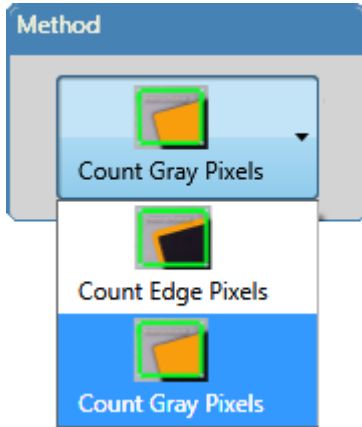
The **Presence/Absence Tool** detects the presence of a feature based on pixel intensity or contrast. This tool:

- Counts the number of pixels within a range of intensity from **0** to **255**.
- Counts the number of pixels where there is contrast in the image (pixels that lie along the edge of a feature, for example).



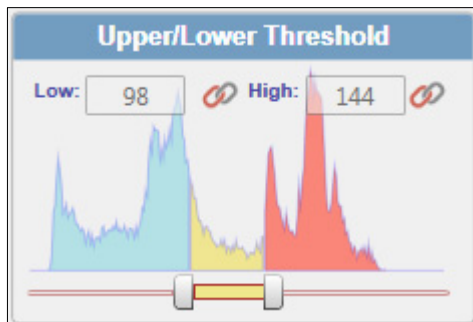
Presence/Absence Tool Parameters

- **Function:** Counts gray pixels within the range defined by the threshold; counts edge pixels that cross over the gradient threshold value.
- **Method:** Counts pixels between a range of gray values *or* counts pixels along an edge transition. **Count Edge Pixels** counts pixels along the edges of objects. **Count Gray Pixels** counts pixels that fall within the specified range of gray values.

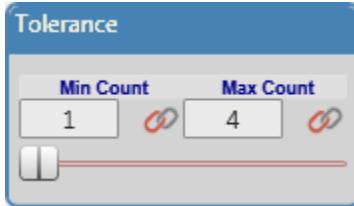


- **Threshold:** Sets the pixel value(s) to be located (0 = black, 255 = white). This changes based on whether **Count Gray Pixels** or **Count Edge Pixels** is selected in the **Function** menu. Count Gray Pixels allows you to set both a **Low Threshold** and **High Threshold** within which to count. Count Edge Pixels allows you to determine the point at which a feature's edges are recognized as edges.

The Presence/Absence Tool's Count Gray Pixels capability displays a histogram of the gray values within its region of interest. This provides a visual aide when setting the tool's low and high threshold values. The dual slider allows you to adjust both the upper and lower thresholds. The portion of the histogram that is within the threshold range is displayed in yellow; the portion that is below the low threshold is displayed in blue; the portion that is above the high threshold is displayed in red.



- **Tolerance:** Sets the tolerance on the minimum and maximum number of pixels allowable for the inspection to pass.



- **Enable ROI Rotation**



Presence/Absence Tool Outputs

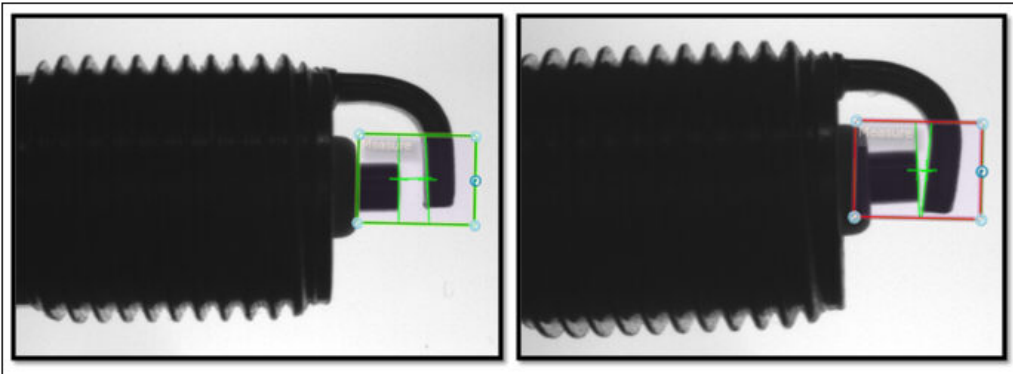
- **Status:** Pass/Fail
- **Pixel Count**

Measure Tool

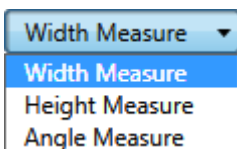


The **Measure Tool** allows you to perform width or height measurements between two edges. This tool:

- Finds two edges, then measures the distance between them.
- Looks for dark objects on a light background or light objects on a dark background.
- Outputs measurements in pixels.
- Rejects measurements outside the user-defined tolerances.



The Measure Tool has a **Width Measure**, **Height Measure**, and **Angle Measure** capability. Select the desired capability from the dropdown menu above the tool parameters.



Important: When switching between Width Measure, Height Measure, and Angle Measure, the links between tool outputs and GDS tags are lost. This is because the underlying components that make up the Measure Tool are completely removed and then recreated whenever you change the tool's capability.

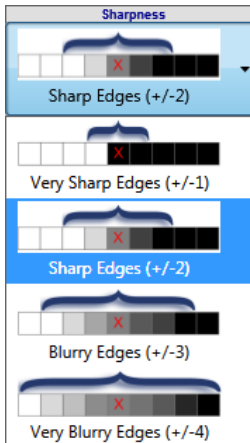
Measure Tool Parameters

Width Measure

- **Function:** Width measurement
- **Edge Selection – Polarity:** Determines whether to measure a dark or light object with respect to the background. **Light to Dark Edges** searches for edges that transition from a light background to a dark object. **Dark to Light Edges** searches for edges that transition from a dark background to a light object. **Any Edge** searches for edges of any polarity.

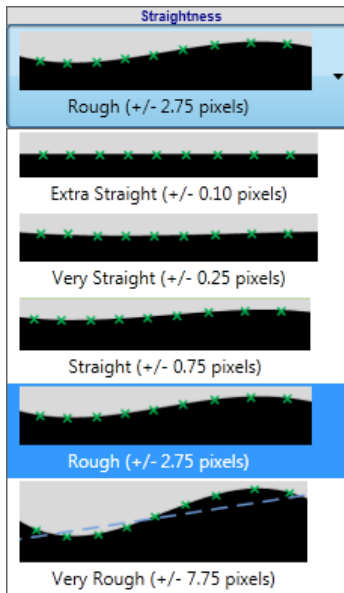


- **Edge Selection – Sharpness:** Determines the sharpness of the edge. **Very Sharp Edges (+/-1)** calculates gradients by looking 1 pixel before and 1 pixel after the analysis pixel. **Sharp Edges (+/-2)** calculates gradients by looking 2 pixels before and 2 pixels after the analysis pixel. **Blurry Edges (+/-3)** calculates gradients by looking 3 pixels before and 3 pixels after the analysis pixel. **Very Blurry Edges (+/-4)** calculates gradients by looking 4 pixels before and 4 pixels after the analysis pixel.

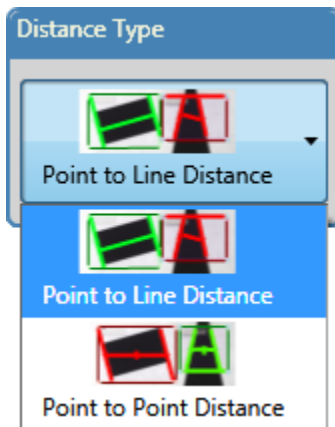


Measure Tool

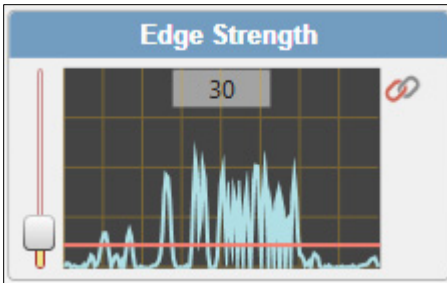
- **Edge Selection – Straightness:** Determines the straightness of the edge.



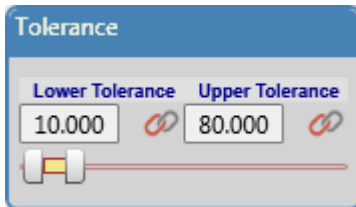
- **Distance Type:** Determines how the distance between two edges of the object should be calculated. **Point to Line Distance** measures the perpendicular distance from the first edge's center point to the second edge's best fit line. Choose Point to Line Distance when measuring between parallel lines. **Point to Point Distance** measures the distance from the center points of two edges. Choose Point to Point Distance when measuring between non-parallel lines, or when you want the rotation of the lines to be ignored.



- **Edge Strength:** The Measure Tool provides a gradient plot to assist with the setting of the edge threshold. The plot shows you how strong the transitions from dark to light or light to dark (gradients) are within the tool's region of interest. The plot is calculated down the center of the ROI, left-to-right when measuring width, top-to-bottom when measuring height, and at the user-defined angle when measuring angle. A red horizontal line shows where the current threshold is set. Use the slider to adjust the threshold to an optimum value.



- **Tolerance:** Lower and upper tolerance in pixels.

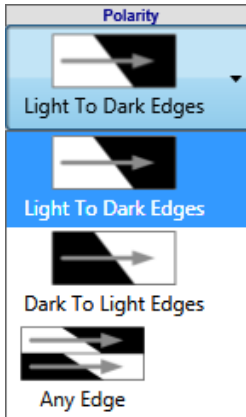


- **Enable ROI Rotation**

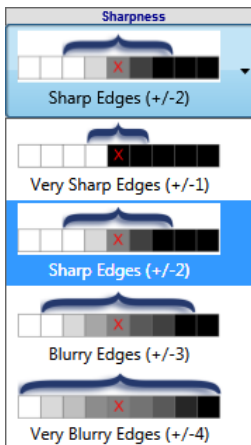


Height Measure

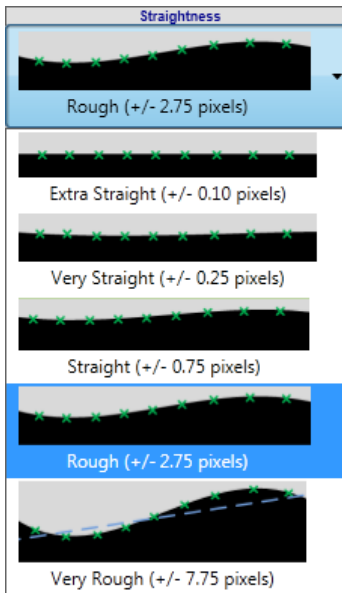
- **Function:** Height measurement
- **Edge Selection – Polarity:** Determines whether to measure a dark or light object with respect to the background. **Light to Dark Edges** searches for edges that transition from a light background to a dark object. **Dark to Light Edges** searches for edges that transition from a dark background to a light object. **Any Edge** searches for edges of any polarity.



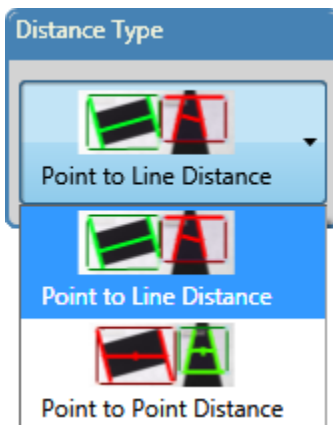
- **Edge Selection – Sharpness:** Determines the sharpness of the edge. **Very Sharp Edges (+/-1)** calculates gradients by looking 1 pixel before and 1 pixel after the analysis pixel. **Sharp Edges (+/-2)** calculates gradients by looking 2 pixels before and 2 pixels after the analysis pixel. **Blurry Edges (+/-3)** calculates gradients by looking 3 pixels before and 3 pixels after the analysis pixel. **Very Blurry Edges (+/-4)** calculates gradients by looking 4 pixels before and 4 pixels after the analysis pixel.



- **Edge Selection – Straightness:** Determines the straightness of the edge.

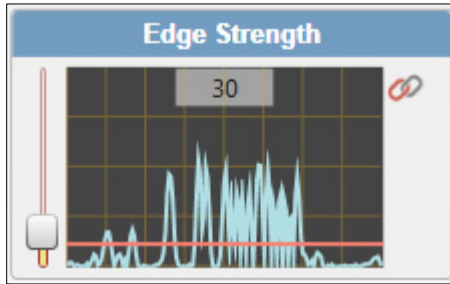


- **Distance Type:** Determines how the distance between two edges of the object should be calculated. **Point to Line Distance** measures the perpendicular distance from the first edge's center point to the second edge's best fit line. Choose Point to Line Distance when measuring between parallel lines. **Point to Point Distance** measures the distance from the center points of two edges. Choose Point to Point Distance when measuring between non-parallel lines, or when you want the rotation of the lines to be ignored.

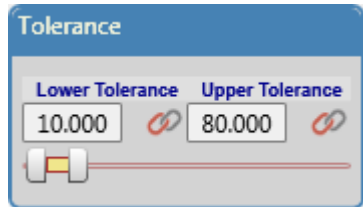


Measure Tool

- **Edge Strength:** The Measure Tool provides a gradient plot to assist with the setting of the edge threshold. The plot shows you how strong the transitions from dark to light or light to dark (gradients) are within the tool's region of interest. The plot is calculated down the center of the ROI, left-to-right when measuring width, top-to-bottom when measuring height, and at the user-defined angle when measuring angle. A red horizontal line shows where the current threshold is set. Use the slider to adjust the threshold to an optimum value.



- **Tolerance:** Lower and upper tolerance in pixels.

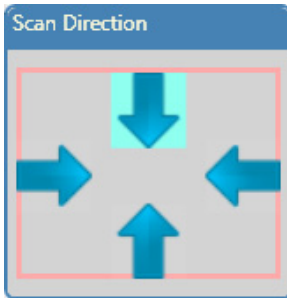


- **Enable ROI Rotation**



Angle Measure

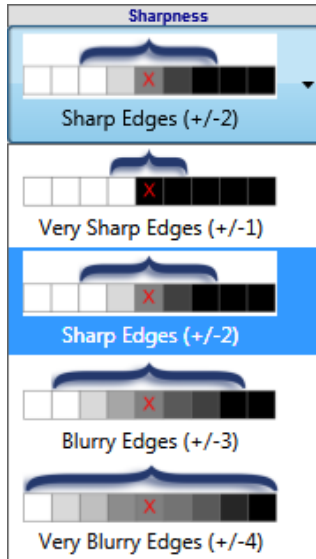
- **Function:** Angle measurement
- **Scan Direction:** Determines whether the tool will scan for an edge from top to bottom, left to right, right to left, or bottom to top.



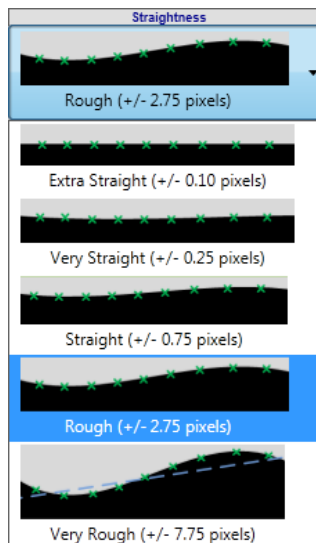
- **Edge Selection – Polarity:** Determines whether to measure a dark or light object with respect to the background. **Light to Dark Edges** searches for edges that transition from a light background to a dark object. **Dark to Light Edges** searches for edges that transition from a dark background to a light object. **Any Edge** searches for edges of any polarity.



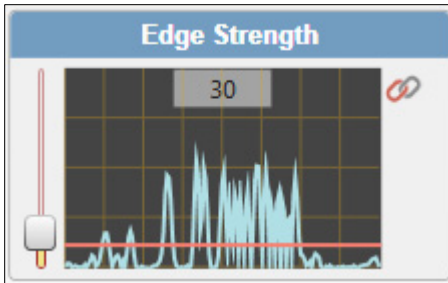
- **Edge Selection – Sharpness:** Determines the sharpness of the edge. **Very Sharp Edges (+/-1)** calculates gradients by looking 1 pixel before and 1 pixel after the analysis pixel. **Sharp Edges (+/-2)** calculates gradients by looking 2 pixels before and 2 pixels after the analysis pixel. **Blurry Edges (+/-3)** calculates gradients by looking 3 pixels before and 3 pixels after the analysis pixel. **Very Blurry Edges (+/-4)** calculates gradients by looking 4 pixels before and 4 pixels after the analysis pixel.



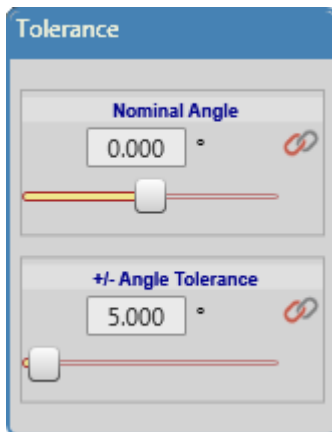
- **Edge Selection – Straightness:** Determines the straightness of the edge.



- **Edge Strength:** The Measure Tool provides a gradient plot to assist with the setting of the edge threshold. The plot shows you how strong the transitions from dark to light or light to dark (gradients) are within the tool's region of interest. The plot is calculated down the center of the ROI, left-to-right when measuring width, top-to-bottom when measuring height, and at the user-defined angle when measuring angle. A red horizontal line shows where the current threshold is set. Use the slider to adjust the threshold to an optimum value.



- **Tolerance:** Expected angle measurement and the range the angle can vary from the nominal angle, in degrees.

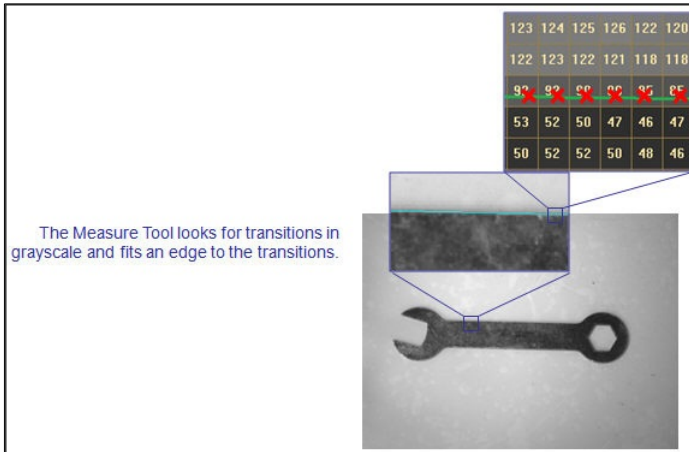


- **Enable ROI Rotation**



Identifying an Edge

- Transitions between dark and light pixels are located.
- Several edge points are created from those transitions.
- The best possible line is then fit to the edge points.



Locating Transitions between Light and Dark

- Edge points are found based on gradient changes over a number of pixels.
- Threshold = Transition of gradient values
- Sharpness = Number of pixels allowed for gradient change

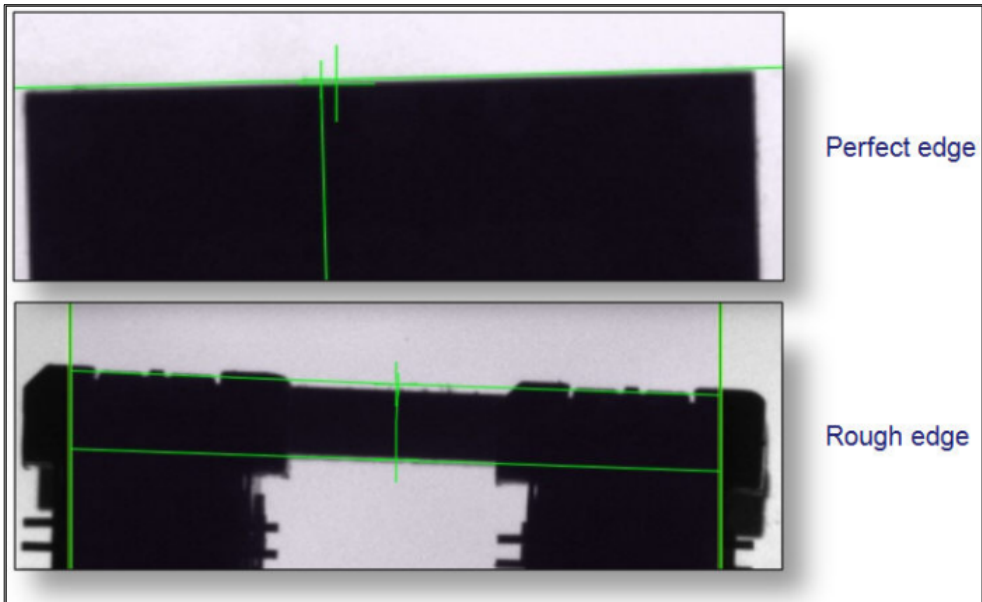


Fitting an Edge Line to Edge Points

- Edge straightness determines how to fit the line.

Perfect Edge = Accurate edge line placement; stray edge points are ignored.

Rough Edge = Edge line placement uses an average of all edge points including stray edges. This is useful when no clearly-defined line is available.



Measure Tool Outputs

- **Status:** Pass/Fail
- **Measurement**
- **Edge Points**
- **Edge Lines**
- **Edge Angles**

Match Strings Tool



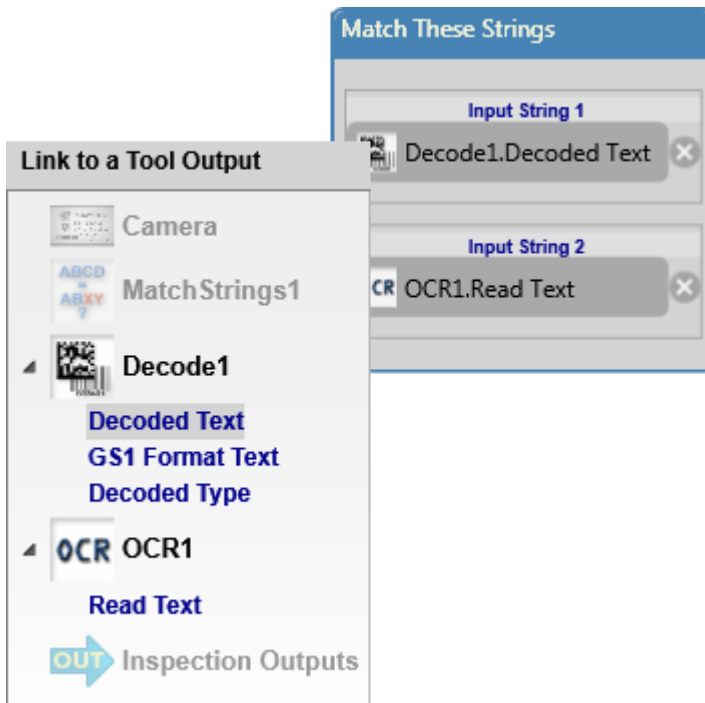
The **Match Strings Tool** allows you to compare two output strings from two different kinds of tools, or two of the same kind of tool.

The Match Strings Tool:

- Uses the outputs from the **Decode Tool**, **OCR Tool**, and **String Format Tool**.

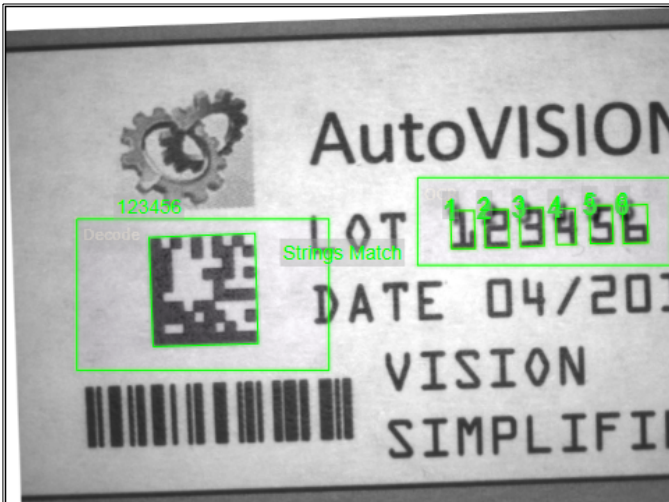
Note: These other tools must execute before **Match Strings** in the job list.

- Compares the two strings.
- Reports whether the tool passes (i.e. the two strings are the same) and when the tool fails (i.e. when the two strings are different).

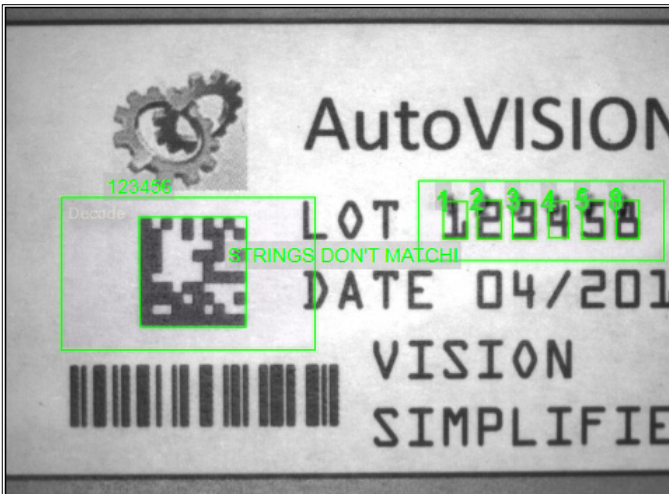


Match Strings Tool

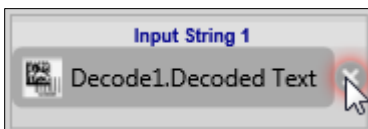
When the two strings match, the message "Strings Match" is shown in the main view area.



When the two strings don't match, the message "STRINGS DON'T MATCH!" is shown in the main view area.



Hint: To reset the **Input String 1** or **Input String 2** values to **Not Connected**, click the **X** to the right of the value you want to disconnect.



Match Strings Tool Output

- **Status:** Pass/Fail

String Format Tool



This tool allows you to format a string to be output. You can select up to two input strings and format based on the following rules:

- Extracted characters are specified by []. [1-4] extract characters 1 through 4. [12] Extracts character 12. [] = Entire string.
- Special characters are specified by '\'. \t (horizontal tab), \r (carriage return), and \n (new line) are supported.
- Any other characters are inserted into the final string.

Examples:

- String = 123
Format = Start[]end
Output = Start123end
- String = ABCDEFG
Format = [2-4][7]
Output = BCDG
- String = ABCDEFG
Format = *[2-4]**[7]?
Output = *BCD**G?

Note: The String Format Tool only accepts the three special characters mentioned above.

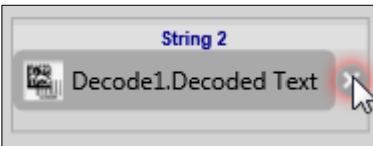
The String Format Tool can:

- Extract a substring from the input string(s) from the Decode Tool or OCR Tool;
- Format characters to be appended or inserted into the input string;
- Append the second input string to the first input string (if two strings are specified).

Hint: Reformat the data as required, then use **Match Strings**.

The screenshot shows two sections of the String Format Tool. The top section, 'Input String 1', has 'String 1' set to 'OCR OCR1.OutStr' and 'Optional Format' set to 'OCR:[]'. The bottom section, 'Input String 2', has 'String 2' set to 'Decode1.Text' and 'Optional Format' set to 'DM:[3-6]\n\r'. Each section includes a small icon representing the data source.

Hint: To reset the Input String 1 or Input String 2 values to Not Connected, right-click the Input String value you want to reset and click Disconnect.



Non-Printable Characters

The String Format Tool accepts the following special characters, which can be used to configure the output string:

- \a bell
- \b backspace
- \f form feed
- \n new line
- \r carriage return
- \t horizontal tab
- \v vertical tab
- \' single quote
- \" double quote
- \? question mark
- \ooo three digit octal notation ASCII value, i.e. \145 = 'e'
- \xhh hexadecimal notation ASCII value, i.e. \x4C = 'L'

Note: To escape the '\' character, use the hexadecimal or octal versions \x5c or \134.

String Format Tool Outputs

- **Status:** Pass/Fail
- **Output String**
- **String 1 Formatted**
- **String 2 Formatted**

Logic Tool



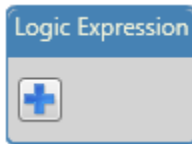
The **Logic Tool** allows you to build simple logic expressions in AutoVISION. These expressions make it possible to combine the results of multiple Tools and tie those results to outputs.

Logic Tool Parameters

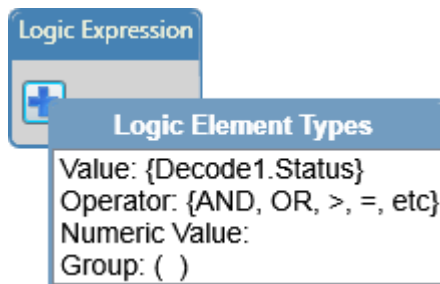
Click the **Logic Expression** field to start building a logic expression.



Click the + to show the **Logic Element Types** menu.



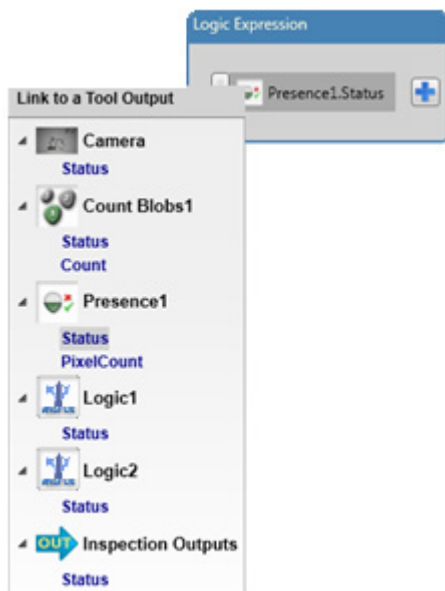
The Logic Element Types menu shows a list of logic elements that can be added to the expression: **Value**, **Operator**, **Numeric Value**, and **Group**.



When you select a logic element, that element appears in the **Logic Expression** popup. You can now add further elements to build the logic expression.

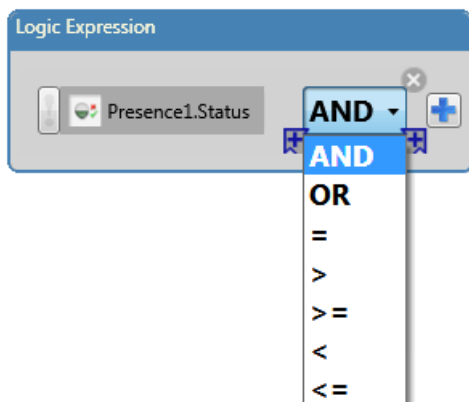
Value

In the example below, **Value** has been selected from the Logic Element Types menu, and the Status (pass/fail) of the Presence/Absence Tool from the vision job has been added to the logic expression.



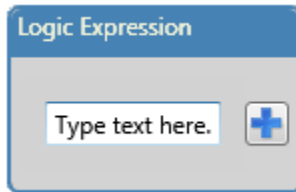
Operator

Click the + button again to add another element to the logic expression. In the example below, **Operator** has been selected from the Logic Element Types menu. The operators **AND**, **OR**, **=**, **>**, **>=**, **<**, and **<=** can be added to the logic expression using the Operator dropdown menu.



Numeric Value

Select **Numeric Value** from the Logic Element Types menu to add text to the logic expression:

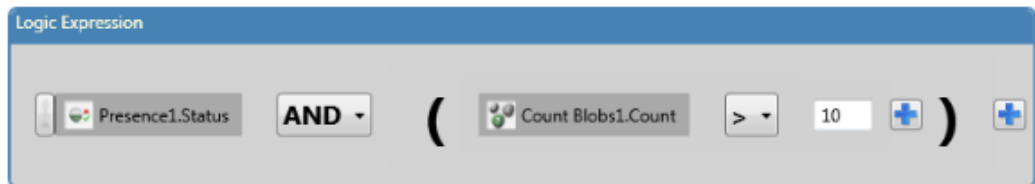


Group

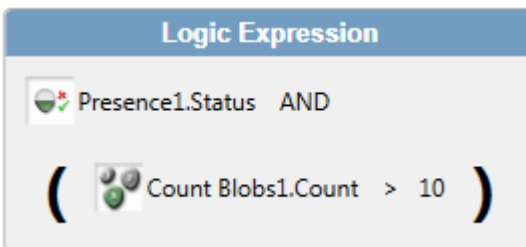
Parentheses can be added to the expression by selecting **Group** from the Logic Element Types menu. The Group element type has two + buttons for inserting elements inside and after the parentheses.



The example below shows an expression that has been built using the following sequence of Logic Element Types: **Value** (Presence/Absence Tool, Status output); **Operator**; **Group**; **Value** (Count Tool, Count output); **Operator**; and **Text**.

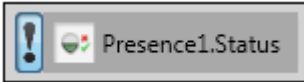


When the Logic Tool Editor is closed, the parameter panel for the Logic Tool shows the completed logic expression:



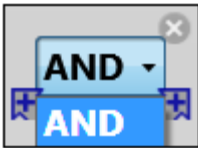
NOT Button

The **NOT** button (!) appears to the left of any Tool Status Value that is added to the logic expression. When selected, it inverts the Status of the Tool Value. In the example below, the expression is TRUE if the Presence/Absence Tool fails.




Option Buttons

When you hover the mouse over any element in the logic expression, three option buttons appear at the corners of the element:



 = Remove this element from the expression.

 = Insert a new element BEFORE this one.

 = Insert a new element AFTER this one.

Logic Tool Output

- **Status:** Pass/Fail

OCV Tool



The **OVC Tool** verifies the quality of characters (also referred to as symbols) being inspected by comparing them to a standard font and detecting defects.

OCV Tool Parameters

OCV Tool parameters include controls for **Defect Detection**, **Filtering**, and **Settings**.

The screenshot shows the OCV Tool parameters window with three sections:

- Defect Detection:** Contains a green checkmark icon, "Total Residue Area 15 %", and a red X icon with "Largest Res. Blob 10 %".
- Filtering:** Contains "Minimum Symbol Size 50" and "Residue Cleanup 1".
- Settings:** Contains "Single Symbol" with a red X icon and "AutoFind the Symbols" with a green checkmark icon.

Defect Detection

Click the **Defect Detection** area of the OCV Tool parameters to display controls for **Tolerance** and **Units** (**Percentage** of total symbol size, or an absolute value in **Pixels**). You can also determine whether the tool bases defects on **Total Residue Area** or **Largest Blob**, or set it to **Check Minimum Contrast**, which rejects any symbol whose contrast falls below 50% of the trained symbol's contrast.

The screenshot shows the Defect Detection section of the OCV Tool parameters window. It includes a "Residue Example" section with three images: "Trained Symbol" (a large black '6'), "Inspected Symbol" (a smaller, slightly distorted '6'), and "Residue" (a red box highlighting the difference between the two). To the right of the images are controls for "Defects Based on..." and "Tolerance".

Defects Based on...

- ☒ Total Residue Area
- ☐ Largest Blob
- ☐ Check Minimum Contrast

Tolerance

15.000

Units

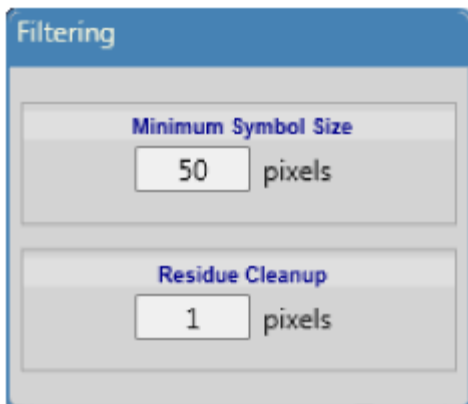
Percentage

Filtering

Click the **Filtering** area of the OCV Tool parameters to display controls for **Minimum Symbol Size** and **Residue Cleanup**.

Minimum Symbol Size allows you to set the minimum number of pixels required for a blob to constitute a symbol.

Residue Cleanup allows you to set the number of pixels to remove around the perimeter of each blob of residue. Increase this value if the size of symbols varies by a large amount.



The screenshot shows a dialog box titled "Filtering" with a blue header. It contains two sections. The first section, "Minimum Symbol Size", has a text input field with the value "50" and the label "pixels" to its right. The second section, "Residue Cleanup", has a text input field with the value "1" and the label "pixels" to its right.

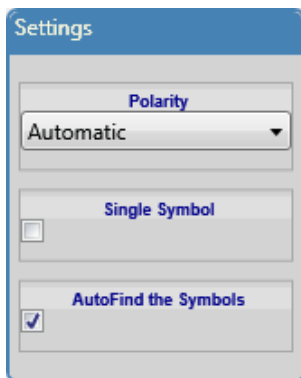
Settings

Click the Settings area of the OCV Tool parameters to display controls for **Polarity**, **Single Symbol**, and **AutoFind the Symbols**.

The OCV Tool can usually detect polarity on its own, but when it can't, set Polarity directly to **Light on Dark** or **Dark on Light**.

Enable **Single Symbol** if you want all features within the template ROI to be trained as one symbol.

Enable **AutoFind the Symbols** to search automatically for trained symbols. Disable AutoFind to save processing time if you are already using a Locate Tool.

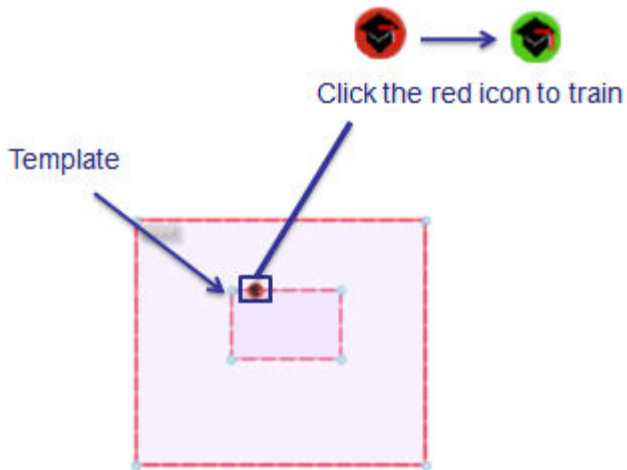


The screenshot shows a dialog box titled "Settings" with a blue header. It contains three sections. The first section, "Polarity", has a dropdown menu with "Automatic" selected. The second section, "Single Symbol", has an unchecked checkbox. The third section, "AutoFind the Symbols", has a checked checkbox.

Training the OCV Tool

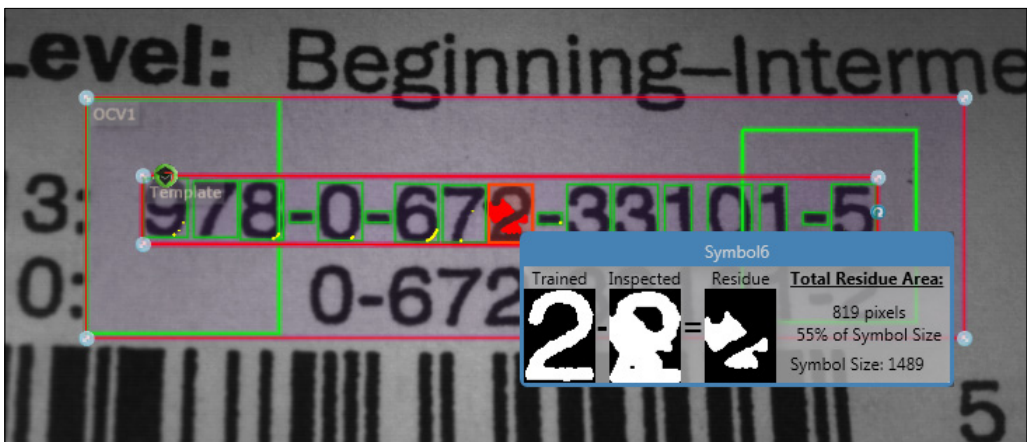
The OCV Tool is trained in the same way as the **Locate Tool**.

- Add the **OCV Tool** to the image area.
- Adjust the **template ROI** around the feature that you want the tool to learn.
- Adjust the **locate ROI** to cover the area within which you expect your feature to move from image to image.
- Train the tool to recognize the characters in the Template ROI by clicking the **Train** icon.



You can then verify the quality of individual characters in the inspection area.

Hint: Click on individual letters to show their detailed results as in the example below, which shows an analysis of a symbol's size and total residue area.



OCV Tool Outputs

- **Status:** Pass/Fail

OCV Tool Advanced Parameters

Click the Advanced Parameters icon at the upper right of the Edit view to access **OCV Tool Advanced Parameters**.



- **AutoFind Pin 1 Index:** Sets the index of the symbol to use as the first AutoFind feature.
- **AutoFind Pin 2 Index:** Sets the index of the symbol to use as the second AutoFind feature.
- **Individual Symbol Search X:** Sets a +/- search range on the X axis that is used to position the template for each symbol more accurately. Increase this value when symbol position varies significantly within the string. Note however that the tool runs more slowly as you increase this value.
- **Individual Symbol Search Y:** Sets a +/- search range on the Y axis that is used to position the template for each symbol more accurately. Increase this value when symbol position varies significantly within the string. Note however that the tool runs more slowly as you increase this value.
- **AutoFind: Distance Tolerance:** Sets the maximum allowed change in the trained distance between the two symbols used by AutoFind.

All Settings: OCV1

AutoFind Pin 1 Index	1
AutoFind Pin 2 Index	999
Individual Symbol Search X	3 pixels
Individual Symbol Search Y	3 pixels
AutoFind: Distance Tolerance	10.000 pixels

Symbol Quality Verification Tool



The **Symbol Quality Verification Tool** evaluates 1D or 2D symbols against the ISO 15415, AIM DPM, and ISO 15416 standards, depending on which verification capability you select.

Symbol Quality Verification Tool Parameters

ISO15415 ▼
 ISO15415
 AIMDPM
 ISO15416

Important: When switching between ISO 15415, AIM DPM, and ISO 15416, the links between tool outputs and GDS tags are lost. This is because the underlying components that make up the Symbol Quality Verification Tool are completely removed and then recreated whenever you change the tool's capability.

ISO 15415 Verification

Verification Settings

Click the **Verification Settings** area of the parameters to bring up the controls for **Aperture**, **Lighting**, and **Setup Notes**.

Verification Settings

Aperture: Auto - 50%

Lighting: Wave Len = 640 / Ang = 90

Calibration

Uncalibrated

Rmin: 4 Rmax: 82

Symbol 1 Width: 0.24 Symbol 2 Width: 0.48

Maximum Exposure: 32000

Custom Verification

Enabled

-- Cell Contrast A B C D F

-- Cell Modulation A B C D F

-- Reflectance Margin A B C D F

-- Fixed Pattern Damage A B C D F

-- Axial Nonuniformity A B C D F

-- Grid Nonuniformity A B C D F

-- Unused Error Correction A B C D F

Aperture automatically sets the aperture size to the user-defined percentage of the decoded cell size. Choose **Auto** if you want the aperture size to be set automatically based on the symbol's cell size. The aperture is set to 50% of the cell size by default. Turn Auto off if you want to enter the Aperture value manually. When Auto is de-selected, a dropdown menu appears allowing you to enter units in **mil** or **mm**.

Aperture: Auto ☐ 5

mil
mil
mm

Lighting Wave Length specifies the wavelength of the lighting being used. This value is for reporting only and does not affect verification results.

Lighting Angle specifies the angle of the lighting being used. Note that this value is for reporting only and does not affect verification results.

Setup Notes allows you to record any additional information that needs to be considered about your camera or lighting configuration.

Calibration

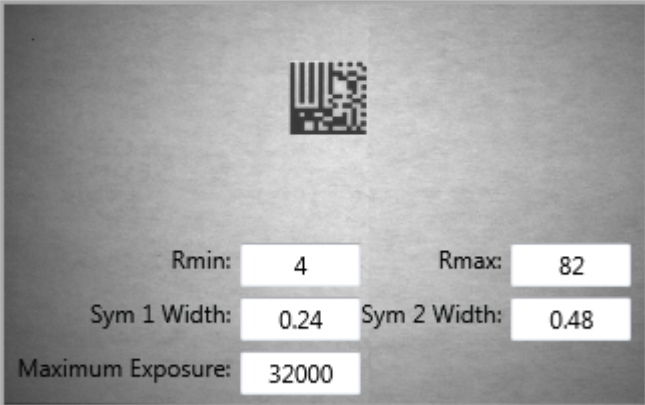
Click the **Calibration** section of the parameters to bring up the dialog shown below. The Calibration dialog features simple instructions about how to calibrate your camera and the Verification Tool in order to be compliant with your chosen verification specification. You must have a Calibration card in order to calibrate your system.

Use this dialog to enter the data from your Calibration card, and then click the **Calibrate** button to start the process.

As part of the calibration process, the **Exposure Time** setting of your camera will be adjusted. Use the **Maximum Exposure** value in the Calibration dialog to set the maximum Exposure Time that can be set.

Calibration

1. Place Calibration Card in front of the Camera.
2. Roughly center the symbol in the image.
3. Enter data from Calibration Card below.
4. Press the 'Calibrate' button.



Rmin:

Rmax:

Sym 1 Width:

Sym 2 Width:

Maximum Exposure:

Custom Verification

When you click the box next to **Enable Customized Verification Tests**, you will see the dialog shown below. This dialog allows you to select the individual attributes on which the verification will be based, and to define **Good/Fair/Poor** ranges for each attribute.

Important: Disabling parameters using the **Custom Verification** dialog results in a verification process that no longer strictly conforms to the ISO 15415 standard.

Custom Verification

☒ Enable Customized Verification Tests

Verification Tests:

Good Fair Poor

Range For all Items ☐

-- Symbol Contrast ☒ A B C D E F

-- Modulation ☒ A B C D E F

-- Reflectance Margin ☒ A B C D E F

-- Fixed Pattern Damage ☒ A B C D E F

-- Axial Nonuniformity ☒ A B C D E F

-- Grid Nonuniformity ☒ A B C D E F

-- Unused Error Correction ☒ A B C D E F

-- Print Growth ☐

ISO 15415 Verification Parameters

- **Symbol Contrast** — The difference in the population of dark pixels to the population of light pixels; compares to AIM DPM “Cell Contrast”.
- **Modulation** — In ISO/IEC 15415, a measurement of the uniformity of the color of the dark areas and the light areas of the Data Matrix similar to “Cell Modulation”, but differs in the implementation details.
- **Reflectance Margin** — A measurement of how well each module is correctly distinguishable as light or dark in comparison to the global threshold.
- **Fixed Pattern Damage** — A measurement of the errors in the borders of the Data Matrix as well as any errors in the quiet zone around the symbol necessary for the decoding process.
- **Axial Nonuniformity** — The difference between the height and the width with respect to the rows and columns.
- **Grid Nonuniformity** — This measurement is a delta of the difference of the measured grid in relation to the ideal grid formed from the four corners of the Data Matrix.
- **Unused Error Correction** — The amount of error correction that could be read incorrectly when the symbol is still readable that is currently being read correctly, expressed as a percentage.
- **Print Growth** — The positive or negative size relation of the cells as printed with respect to the ideal grid.
- **Reference Decode** — A pass/fail measurement of the Data Matrix based upon a binary image of the symbol as specified in ISO/IEC 16022.

ISO 15415 Verification Report

ISO15415 Verification1 : Verification Report

A
Good

Reported Grade: 4.0/08/640/90
 >> Grade: 4.0 / Aperture: 08 / WaveLength: 640 / LightAngle: 90
 Decode: 30Q324343430794<OQQ
 Cell Size: 15.5mil

Parameter Grades:

	Grade	Score	Units
Symbol Contrast	A	78	%
Modulation	A		
Reflectance Margin	A		
Fixed Pattern Dmg	A		
Axial NonUniformity	A	0	%
Grid NonUniformity	A	8	%
Unused Err Correction	A	100	%

Calibration Data:

State:	Calibrated
Target Symbol 1 Width:	0.2399999994635582
Target Symbol 2 Width:	0.4799999989271164
Maximum Exposure:	32000
Target Rmin:	4
Target Rmax:	82

ISO 15415 Numeric Score and Grade Level Comparison

Grade	A 4	B 3	C 2	D 1	F 0	Comments
Axial Nonuniformity	<=0.06	<=0.08	<=0.10	<=0.12	>0.12	X and Y
Contrast	>=0.70	>=0.55	>=0.40	>=0.20	<0.20	
Fixed Pattern Damage	This measurement is developed through a three stage process. There is no grade correlation between raw score and the final score. The initial raw value is used with an overlay technique to achieve the final result.					
Grid Nonuniformity	<=0.38	<=0.50	<=0.63	<=0.75	>0.75	
Modulation	This measurement is developed through a three stage process. There is no grade correlation between raw score and the final score. The initial raw value is used with an overlay technique to achieve the final result.					
Reference Decode	Pass				Fail	
Unused Error Correction	>=0.62	>=0.50	>=0.37	>=0.25	<0.25	
Reflectance Margin	A measurement of how well each module is correctly distinguishable as light or dark in comparison to the global threshold.					

ISO 15415 Verification Final Grade

The ISO 15415 final grade is shown in the upper left corner of the verification report and the numeric value is reported as the first field in the reported grade string. The final grade is defined by the lowest grade achieved by any individual grade parameter.

When custom verification is enabled, in addition to setting threshold for Good/Fair/Poor, you have the option to select which parameters are to be included in the final grade calculation. In the below example you can see the impact of removing Axial Non-Uniformity from the grade calculation.

Reported Grade: 4.0/5.8 pixels/640/90
>> Grade: 4.0 / Aperture: 5.8 pixels / WaveLength: 640 / LightAngle: 90
Decode: 01006141419999961750123110123ABC21ANU50
Cell Size: 12.2 pixels

Parameter Grades:	Grade	Score	Units
Symbol Contrast	A	81	%
Modulation	A		
Reflectance Margin	A		
Fixed Pattern Dmg	A		
Axial NonUniformity	D	11	%
Grid NonUniformity	A	3	%
Unused Err Correction	A	100	%

Calibration Data:

State:	Calibrated
Target Symbol 1 Width:	0.24
Target Symbol 2 Width:	0.48
Maximum Exposure:	32000
Target Rmin:	4
Target Rmax:	82

AIM DPM Verification

Verification Settings

Click the **Verification Settings** area of the parameters to bring up the controls for **Aperture**, **Lighting**, and **Setup Notes**.

Verification Settings

Aperture: Auto - 50%

Lighting: Wave Len = 640 / Ang = 90

Calibration

Uncalibrated

Rmin: 4Rmax: 82

Symbol 1 Width: 0.24Symbol 2 Width: 0.48

Maximum Exposure: 32000

Custom Verification

Enabled

-- Cell ContrastA B C D F

-- Cell ModulationA B C D F

-- Reflectance MarginA B C D F

-- Fixed Pattern DamageA B C D F

-- Axial NonuniformityA B C D F

-- Grid NonuniformityA B C D F

-- Unused Error CorrectionA B C D F

Aperture automatically sets the aperture size to the user-defined percentage of the decoded cell size. Choose **Auto** if you want the aperture size to be set automatically based on the symbol's cell size. The aperture is set to 50% of the cell size by default. Turn Auto off if you want to enter the Aperture value manually. When Auto is de-selected, a dropdown menu appears allowing you to enter units in **mil** or **mm**.

Aperture: Auto☐

mil

mil

mm

Lighting Wave Length specifies the wavelength of the lighting being used. This value is for reporting only and does not affect verification results.

Lighting Angle specifies the angle of the lighting being used. Note that this value is for reporting only and does not affect verification results.

Setup Notes allows you to record any additional information that needs to be considered about your camera or lighting configuration.

Calibration

Click the **Calibration** section of the parameters to bring up the dialog shown below. The Calibration dialog features simple instructions about how to calibrate your camera and the Verification Tool in order to be compliant with your chosen verification specification. You must have a Calibration card in order to calibrate your system.

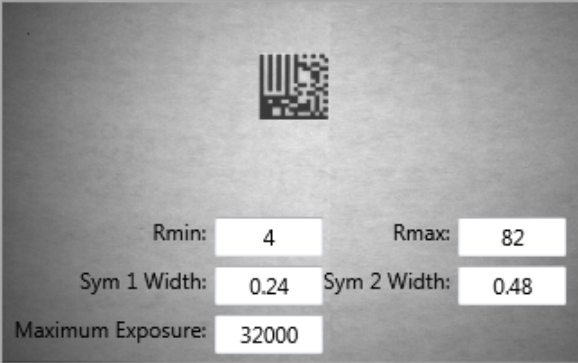
Use this dialog to enter the data from your Calibration card, and then click the **Calibrate Reflectance** button to start the process.

As part of the calibration process, the **Exposure Time** setting of your camera will be adjusted. Use the **Maximum Exposure** value in the Calibration dialog to set the maximum Exposure Time that can be set.

Calibration

Reflectance Calibration

1. Place Calibration Card in front of the Camera.
2. Roughly center the symbol in the image.
3. Enter data from Calibration Card below.
4. Press the 'Calibrate Reflectance' button.



Rmin:	<input type="text" value="4"/>	Rmax:	<input type="text" value="82"/>
Sym 1 Width:	<input type="text" value="0.24"/>	Sym 2 Width:	<input type="text" value="0.48"/>
Maximum Exposure:	<input type="text" value="32000"/>		

Part Calibration

5. Place part in front of the Camera.
6. Click the 'Part Calibration' button.
7. Repeat steps 5 and 6 for each part.

Custom Verification

When you click the box next to **Enable Customized Verification Tests**, you will see the dialog shown below. This dialog allows you to select the individual attributes on which the verification will be based, and to define **Good/Fair/Poor** ranges for each attribute.

Important: Disabling parameters using the **Custom Verification** dialog results in a verification process that no longer strictly conforms to the AIM DPM standard.

Custom Verification

☒ Enable Customized Verification Tests

Verification Tests:

Good Fair Poor

Range For all Items ☐

-- Cell Contrast ☒ A B C D E F

-- Cell Modulation ☒ A B C D E F

-- Reflectance Margin ☒ A B C D E F

-- Fixed Pattern Damage ☒ A B C D E F

-- Axial Nonuniformity ☒ A B C D E F

-- Grid Nonuniformity ☒ A B C D E F

-- Unused Error Correction ☒ A B C D E F

-- Print Growth ☐

AIM DPM Verification Parameters

- **Cell Contrast** — In AIM DPM, the difference in the population of dark pixels to the population of light pixels, using the sample principle as “Symbol Contrast” with modified definition.
- **Cell Modulation** — In AIM DPM, a measurement of the uniformity of the color of the dark areas and the light areas of the Data Matrix similar to “Modulation”, but differing in the implementation details.
- **Reflectance Margin** — A measurement of how well each module is correctly distinguishable as light or dark in comparison to the global threshold.
- **Fixed Pattern Damage** — A measurement of the errors in the borders of the Data Matrix as well as any errors in the quiet zone around the symbol necessary for the decoding process.
- **Axial Nonuniformity** — The difference between the height and the width with respect to the rows and columns.
- **Grid Nonuniformity** — A delta of the difference of the measured grid in relation to the ideal grid formed from the four corners of the Data Matrix.
- **Unused Error Correction** — The amount of error correction that could be read incorrectly when the symbol is still readable that is currently being read correctly, expressed as a percentage.
- **Print Growth** — The positive or negative size relation of the cells as printed with respect to the ideal grid.
- **Minimum Reflectance** — The lowest reflectance of any sample area in the Data Matrix.
- **Reference Decode** — A pass/fail measurement of the Data Matrix based upon a binary image of the symbol as specified in ISO/IEC 16022.

AIM DPM Verification Report

B
Good

Reported Grade: DPM3.0/11/640/90
 >> Grade: DPM3.0 / Aperture: 11 / WaveLength: 640 / LightAngle: 90
 Decode: Test Data Matrix for fixed pattern grading.
 Cell Size: 14.5425531914894mil

Parameter Grades:

	Grade	Score	Units
Cell Contrast	A	89	%
Cell Modulation	A		
Reflectance Margin	A		
Fixed Pattern Dmg	B		
Axial NonUniformity	A	0	%
Grid NonUniformity	A	9	%
Unused Err Correction	A	100	%

Calibration Data:

State:	Calibrated
Target Symbol 1 Width:	0.2399999994635582
Target Symbol 2 Width:	0.4799999989271164
Maximum Exposure:	32000

AIM DPM Numeric Score and Grade Level Comparison

Grade	A 4	B 3	C 2	D 1	F 0	Comments
Cell Contrast	>=30%	>=25%	>=20%	>=15%	<15%	
Axial Nonuniformity	<=6%	<=8%	<=10%	<=12%	>12%	Calculation differs slightly from ISO 15415
Grid Nonuniformity	<=0.38	<=0.50	<=0.63	<=0.75	>0.75	Calculation differs slightly from ISO 15415
Unused Error Correction	>=62%	>=50%	>=37%	>=25%	<25%	
Fixed Pattern Damage	This measurement is developed through a three stage process. There is no grade correlation between raw score and the final score. The initial raw value is used with an overlay technique to achieve the final result.					
Cell Modulation	This measurement is developed through a three stage process. There is no grade correlation between raw score and the final score. The initial raw value is used with an overlay technique to achieve the final result.					
Reference Decode	Pass				Fail	
Minimum Reflectance	>=5%				<5%	
Reflectance Margin	A measurement of how well each module is correctly distinguishable as light or dark in comparison to the global threshold.					

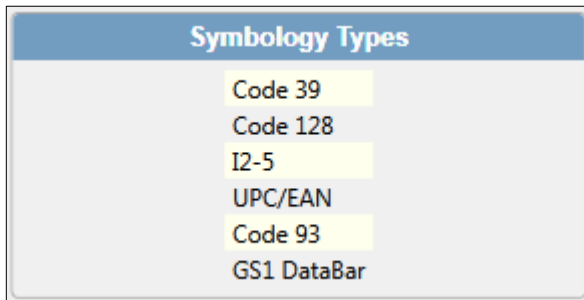
AIM DPM Verification Final Grade

The AIM DPM final grade is determined in the same way as the ISO 15415 final grade.

ISO 15416 Verification

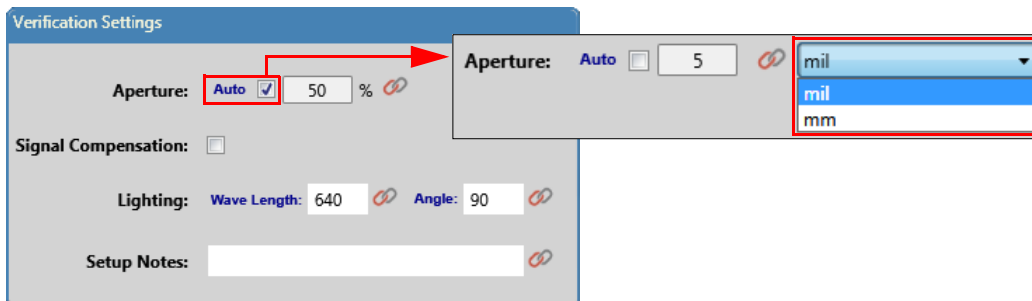
Symbology Types

Click the **Symbology Types** you want to verify to the ISO 15416 standard.



Verification Settings

Click the **Verification Settings** area of the parameters to bring up the controls for **Aperture**, **Signal Compensation**, **Lighting**, and **Setup Notes**.



Aperture automatically sets the aperture size to the user-defined percentage of the decoded cell size. Choose **Auto** if you want the aperture size to be set automatically based on the symbol's cell size. The aperture is set to 50% of the cell size by default. Turn Auto off if you want to enter the Aperture value manually. When Auto is de-selected, a dropdown menu appears allowing you to enter units in **mil** or **mm**.

Signal Compensation compensates for uneven lighting. This parameter improves grading performance, but note that it is not a part of the ISO 15416 standard, and therefore not technically compliant.

Lighting Wave Length specifies the wavelength of the lighting being used. Note that this value is for reporting only and does not affect verification results.

Lighting Angle specifies the angle of the lighting being used. Note that this value is for reporting only and does not affect verification results.

Setup Notes allows you to add any other information about your camera or lighting configuration that needs to be considered.

Calibration

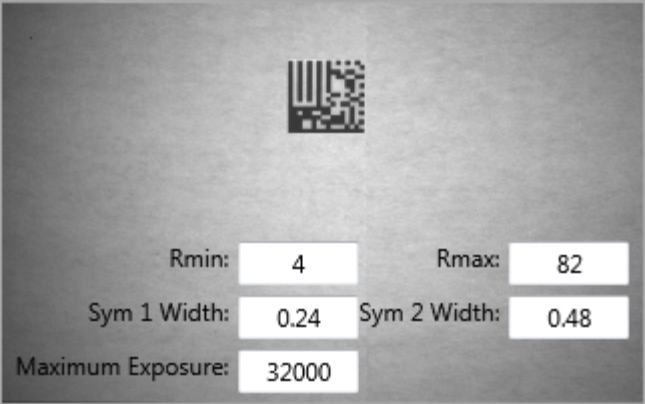
Click the **Calibration** section of the parameters to bring up the dialog shown below. The Calibration dialog features simple instructions about how to calibrate your camera and the Verification Tool in order to be compliant with your chosen verification specification. You must have a Calibration card in order to calibrate your system.

Use this dialog to enter the data from your Calibration card, and then click the **Calibrate** button to start the process.

As part of the calibration process, the **Exposure Time** setting of your camera will be adjusted. Use the **Maximum Exposure** value in the Calibration dialog to set the maximum Exposure Time that can be set.

Calibration

1. Place Calibration Card in front of the Camera.
2. Roughly center the symbol in the image.
3. Enter data from Calibration Card below.
4. Press the 'Calibrate' button.

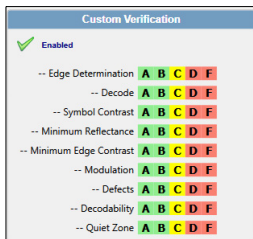


Rmin:	<input type="text" value="4"/>	Rmax:	<input type="text" value="82"/>
Sym 1 Width:	<input type="text" value="0.24"/>	Sym 2 Width:	<input type="text" value="0.48"/>
Maximum Exposure:	<input type="text" value="32000"/>		

Custom Verification

When you click the box next to **Enable Customized Verification Tests**, you will see the dialog shown below. This dialog allows you to select the individual attributes on which the verification will be based, and to define **Good/Fair/Poor** ranges for each attribute.

Important: Disabling parameters using the **Custom Verification** dialog results in a verification process that no longer strictly conforms to the ISO 15416 standard.



ISO 15416 Verification Parameters

- **Edge Determination** — Bar and space edge transitions are defined by where they cross the global threshold of the symbol. The global threshold is the midpoint of the maximum reflectance (brightest) and the minimum reflectance (darkest) sample in the scan line. If the global threshold is crossed more than once per bar space transition or does not cross between one of these bar space pairs the symbol will not be able to decode and will receive an **F** grade for Edge Determination. If the proper number of element transitions occurs the symbol will receive an **A** grade for Edge Determination.
- **Decode** — The decoding of the symbol using the symbology reference decode algorithm using the element edges found in Edge Determination.
- **Symbol Contrast** — The difference between the highest and the lowest reflectance values in a scan reflectance profile.
- **Minimum Reflectance** — Percentage value of reflectance of darkest bar.
- **Minimum Edge Contrast** — Percentage value of minimum edge contrast. Edge Contrast is the difference between the bar reflectance and space reflectance of two adjacent elements.
- **Modulation** — The ratio of minimum edge contrast to symbol contrast.
- **Defects** — Irregularities found within elements and quiet zones, measured in terms of element reflectance non-uniformity.
- **Decodability** — Decodability can be defined as the amount of margin remaining to properly read the characters in the symbol. Each symbology specification graded under ISO 15416 has published dimensions and margins of tolerance for the decoding of characters. Printing and imaging accuracy will impact these dimensions and the ability to decode the symbol. Decodability quantifies this margin for each symbol.
- **Quiet Zone** — The regions before the start and stop characters. Each symbology specification graded under ISO 15416 has published the required amount of Quiet Zone for both the region before the start and after the stop character. The Quiet Zone is measured as an integer factor of the nominal bar width. For example, 10x would be a quiet zone 10 times larger than the nominal bar width. If either the start or stop Quiet Zone is violated, the scan line will receive an **F** grade for the Quiet Zone for that scan line.

ISO 15416 Verification Report

B

Reported Grade: 2.9/09/640/90

>> Grade: 2.9 / Aperture: 09 / WaveLength: 640 / LightAngle: 90

Decode: 0000006300005

Bar Width: 9.5mil

Good

Parameter Grades:

	1	2	3	4	5	6	7	8	9	10	Avg
Edge Determination	A	A	A	A	A	A	A	A	A	A	A
Decode	A	A	A	A	A	A	A	A	A	A	A
Symbol Contrast	A	A	A	A	A	A	A	A	A	A	A
	80%	80%	80%	79%	80%	79%	79%	79%	79%	78%	
Min Reflectance	A	A	A	A	A	A	A	A	A	A	A
	(11-91)%	(11-91)%	(11-91)%	(11-90)%	(11-91)%	(11-90)%	(11-90)%	(11-90)%	(11-90)%	(11-89)%	
Min Edge Contrast	A	A	A	A	A	A	A	A	A	A	A
	62%	62%	62%	62%	62%	61%	62%	61%	62%	62%	
Modulation	A	A	A	A	A	A	A	A	A	A	A
	78%	77%	78%	78%	77%	77%	78%	77%	78%	79%	
Defects	B	C	B	B	B	B	B	B	B	B	B
	20	21	20	20	20	18	17	18	18	18	
Decodability	A	A	A	A	A	A	A	A	A	A	A
	92%	93%	91%	92%	91%	92%	93%	92%	93%	92%	
QuietZone	A	A	A	A	A	A	A	A	A	A	A
	(8.9-8.9)	(8.9-8.9)	(8.9-8.9)	(8.9-8.9)	(8.9-8.9)	(8.9-8.9)	(8.9-8.9)	(8.9-8.9)	(8.9-8.9)	(8.9-8.9)	
Final	B	C	B	B	B	B	B	B	B	B	B
	3	2	3	3	3	3	3	3	3	3	

Calibration Data:

State:

Calibrated

Target Symbol 1 Width:

0.2399999994635582

Target Symbol 2 Width:

0.4799999998271164

Target Rmin:

4

Target Rmax:

82

Max Exposure:

32000

ISO 15416 Numeric Score and Grade Level Comparison

Grade	A 4	B 3	C 2	D 1	F 0	Comments
Min Reflectance	<=0.5Rmax				>0.5Rmax	Rmax is Max Reflectance
Symbol Contrast	>=0.70	>=0.55	>=0.40	>=0.20	<0.20	
Min Edge Contrast	>=0.15				<0.15	
Modulation	>=0.70	>=0.60	>=0.50	>=0.40	<0.40	
Defects	<=0.15	<=0.20	<=0.25	<=0.30	>0.30	
Decodability	>=0.62	>=0.50	>=0.37	>=0.25	<0.25	
Quiet Zone	>= spec				< spec	

ISO 15416 Verification Final Grade

The ISO 15416 final symbol grade is shown in the upper left corner and lower right corner of the verification report and the numeric grade is reported as the first field in the reported grade string. The ISO 15416 final symbol grade is a compilation of the 10 individual scan line final grades applied over the region of the symbol. Each individual scan grade from the 10 scans applied can be found at the bottom of each scan column. This scan grade is the lowest grade from that individual scan. The final symbol grade is the average result of the 10 individual scans. In the follow example you see scans 1-5 have quiet zone violations and receive a grade of F or grade value 0. The scans 6-10 receive a B grade based on the minimum grade of modulation. The final symbol grade is the average of the final scans $(0 + 0 + 0 + 0 + 0 + 3 + 3 + 3 + 3 + 3) / 10 = 1.5$ or grade C. Note that if custom verification is enabled individual parameters can be removed from the scan grade and final grade calculation.

ISO15416 Verification1: Verification Report

C
Fair

Reported Grade: 1.5/3.0 pixels/640/90
 >> Grade: 1.5 / Aperture: 3.0 pixels / WaveLength: 640 / LightAngle: 90
 Decode: 00006141411234567890
 Bar Width: 5.9 pixels

Parameter Grades:

	1	2	3	4	5	6	7	8	9	10	Avg
Edge Determination	A	A	A	A	A	A	A	A	A	A	A
Decode	A	A	A	A	A	A	A	A	A	A	A
Symbol Contrast	A	A	A	A	A	A	A	A	A	A	A
	76%	77%	77%	78%	78%	79%	80%	81%	81%	82%	
Min Reflectance	A	A	A	A	A	A	A	A	A	A	A
	(9-85)%	(9-86)%	(9-86)%	(9-87)%	(9-87)%	(8-87)%	(8-88)%	(8-89)%	(9-90)%	(9-91)%	
Min Edge Contrast	A	A	A	A	A	A	A	A	A	A	A
	55%	56%	56%	55%	55%	55%	55%	55%	55%	54%	
Modulation	A	A	A	A	A	B	B	B	B	B	A
	72%	72%	72%	71%	70%	69%	69%	67%	67%	66%	
Defects	A	A	A	A	A	A	A	A	A	A	A
	3	3	3	2	3	5	5	4	5	6	
Decodability	A	A	A	A	A	A	A	A	A	A	A
	84%	88%	87%	88%	84%	86%	86%	87%	87%	87%	
QuietZone	F	F	F	F	F	A	A	A	A	A	C
	(6.6-6.8)	(6.6-6.8)	(6.8-6.8)	(6.6-6.8)	(6.6-6.8)	(10-10)	(10-10)	(10-10)	(10-10)	(10-10)	
Final	F	F	F	F	F	B	B	B	B	B	C
	0	0	0	0	0	3	3	3	3	3	

Calibration Data:

State: Not Calibrated

Target Symbol 1 Width: 0

Target Symbol 2 Width: 0

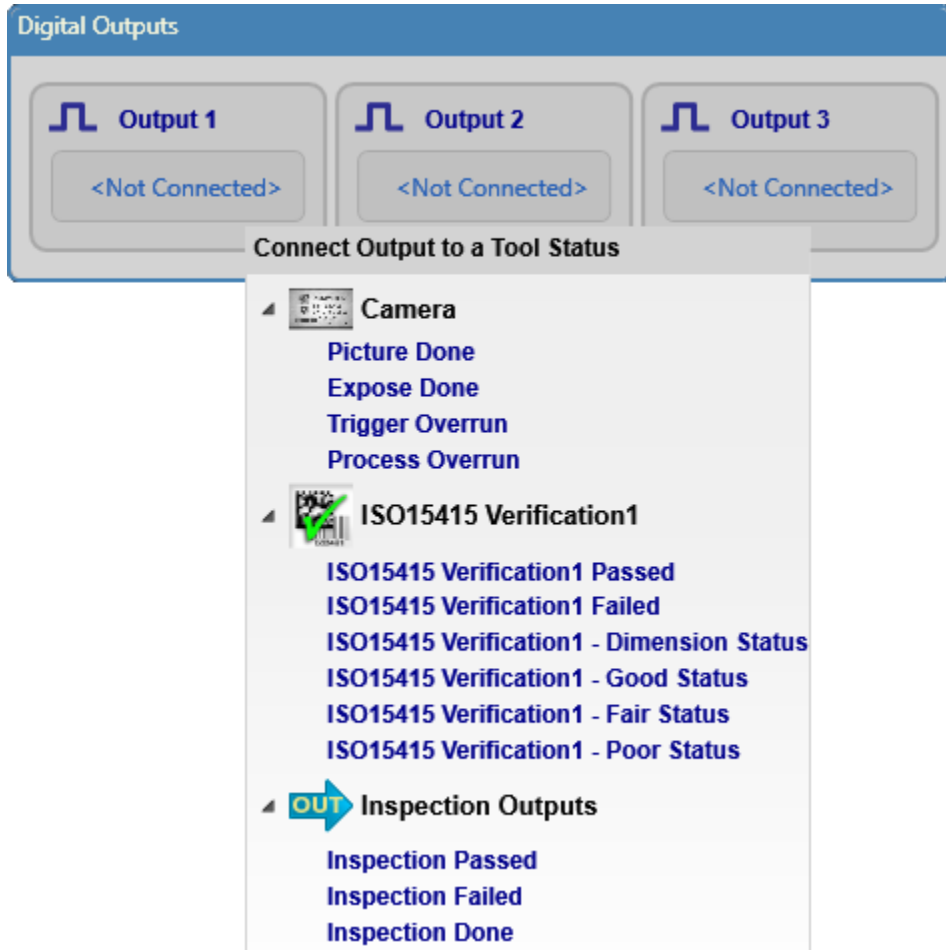
Target Rmin: 4

Target Rmax: 82

Max Exposure: 32000

Verification Results

All verification output values can be output through **Inspection Outputs**. All verification status outputs can be tied to the camera's **Digital Outputs**.



Symbol Quality Verification Tool Outputs

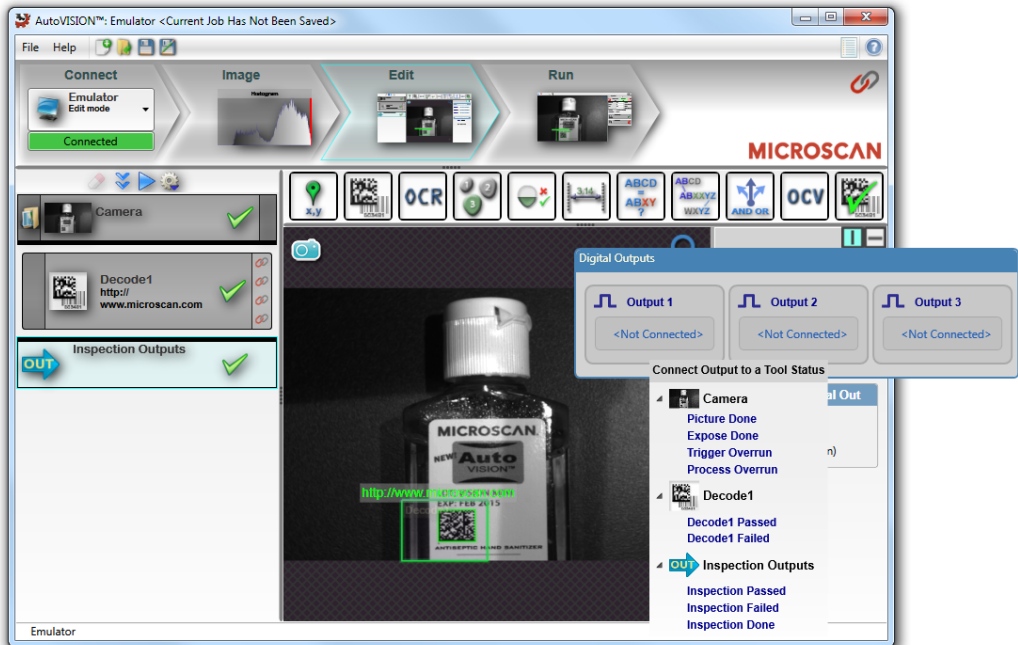
- **ISO 15415 Status:** Pass/Fail
- **ISO 15415 Grade Value**
- **AIM DPM Status:** Pass/Fail
- **AIM DPM Grade Value**
- **ISO 15416 Status:** Pass/Fail

Inspection Outputs

The **Inspection Outputs Tool** is used to communicate the results of your inspection to the outside world. You can output results via Digital I/O, or as string data sent via the Serial port or the Ethernet port (via TCP/IP).

Inspection Outputs allow you to:

- Connect the Digital I/O of the camera to the results of your job;
- Produce a formatted string from the inspection data and send it out the Serial or Ethernet port.



Digital Outputs

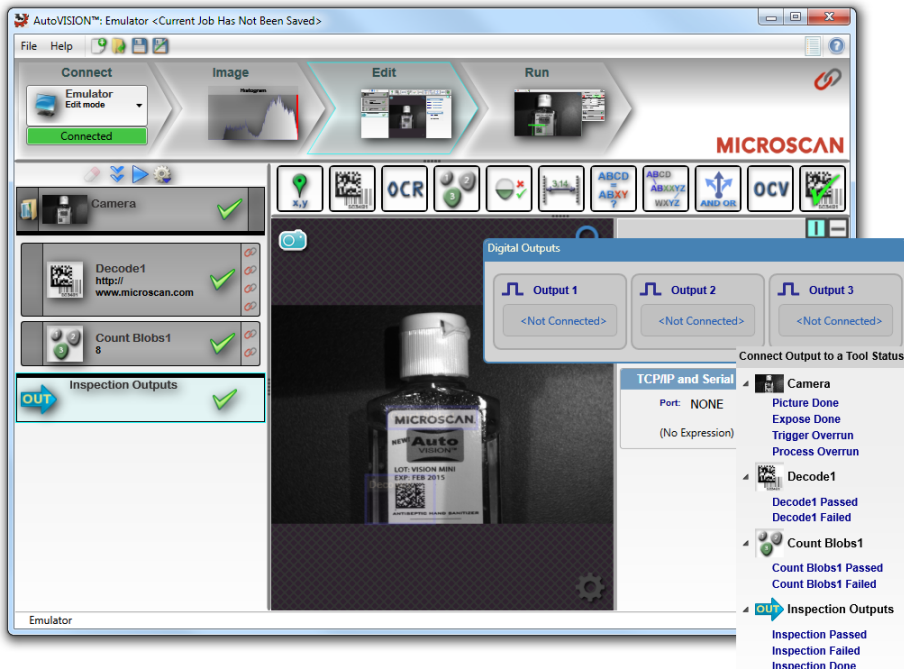
There are three outputs (**Output 1**, **Output 2**, **Output 3**) that can be assigned to report inspection status.

Note: Outputs only function when a camera is connected.

Outputs **1**, **2**, and **3** are shown on the top of the Vision HAWK, where LEDs indicate output status:



Digital Outputs can be configured for all three outputs on the **Digital Outputs** tab of the **Inspection Outputs** tool.

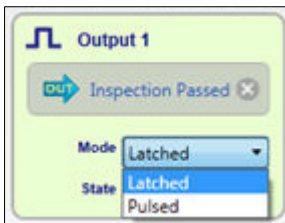


Inspection

- **Inspection Passed:** Activates the output if the inspection passes. The pass state can be connected to any tool in the job for output.
- **Inspection Failed:** Activates the output if the inspection fails. The fail state can be connected to any tool in the job for output.
- **Inspection Done:** Pulses the I/O point at the end of each inspection cycle. The length of the pulse is user-configurable. The default pulse length is 10ms.

Pulse Mode

When an output is connected to the state of a tool or to the overall inspection, you have the option of changing the behavior of the output via **Pulse Mode**. Output 1 is connected to the "Inspection Passed" state in the example below. This brings up the **Mode** dropdown menu.



- **Latched:** This is the default. The output state is set at the end of the inspection cycle, and that state will remain latched until the end of the next inspection cycle when this output is updated again.
- **Pulsed:** The output state is set at the end of the inspection cycle and a timer is started. When the timer expires, the output is reset to its default state (**Off** if "Active High" is selected in the **State** dropdown menu, **On** if "Active Low" is selected). When **Pulsed** is selected in the **Mode** dropdown menu, a new "Pulse Width" parameter becomes visible as shown in the example below. This parameter allows you to set the width of the pulse in milliseconds.



Active State

When an output is connected to the state of a tool or to the overall inspection, you have the option of changing the active state of the output via the **State** setting.

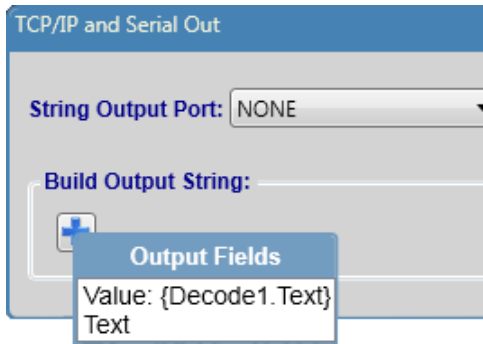


- **Active High:** The normal state of the output is open (low), and it transitions to a closed (high) state whenever it is activated.
- **Active Low:** The normal state of the output is closed (high), and it transitions to an open (low) state whenever it is activated.

Camera

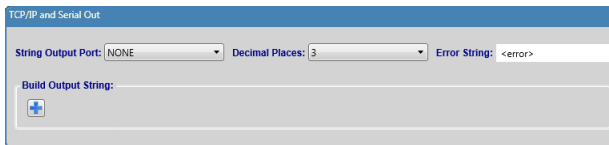
- **Picture Done:** The I/O point is off while the image is being acquired, on when the acquisition is complete.
- **Expose Done:** Turns the I/O point off while the image sensor is being exposed, and on when the exposure is complete. On an indexing machine, it is safe to move your part when the exposure is complete. Note that acquisition is not complete at this point.
- **Trigger Overrun:** Turns on to indicate an error condition in which the camera has been triggered while already in the process of acquiring an image.
- **Process Overrun:** Turns on to indicate the error condition in which the camera is being triggered at a rate that is faster than the speed of the inspection. If the camera is triggered and the previous inspection cycle has not completed, a new image will be acquired and that image buffer will be put into a queue until the camera is ready to process it. If the trigger rate is too high, the number of buffers in this queue may steadily increase until the camera eventually runs out of buffers, and this is when a Process Overrun occurs.

TCP / Serial Output



TCP/Serial Output options allow you to:

- Select Serial or TCP ports for output
- Specify the decimal places for measurement tool output
- Output up to four different tool report fields and five text fields.
- Use special non-printable characters to format TCP/Serial Output.



Hint: To reset any output string value to **Not Connected**, click the **X** to the right of the value you want to disconnect.

Note: When using AutoVISION's Emulator, you can use your TCP connection to view data output.

Special Non-Printable Characters in TCP/Serial Output

TCP/Serial Output accepts the following special characters, which can be used to configure the output string:

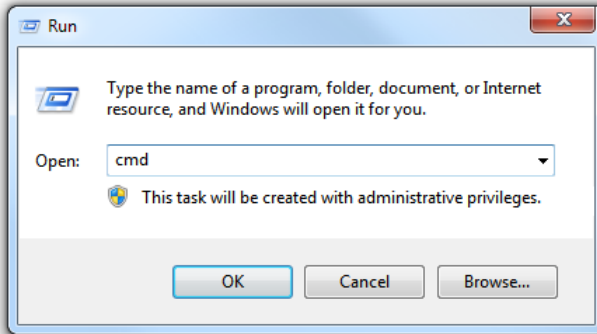
- \a bell
- \b backspace
- \f form feed
- \n new line
- \r carriage return
- \t horizontal tab
- \v vertical tab
- \' single quote
- \" double quote
- \? question mark
- \ooo three digit octal notation ASCII value, i.e. \145 = 'e'
- \xhh hexadecimal notation ASCII value, i.e. \x4C = 'L'

Viewing TCP Output

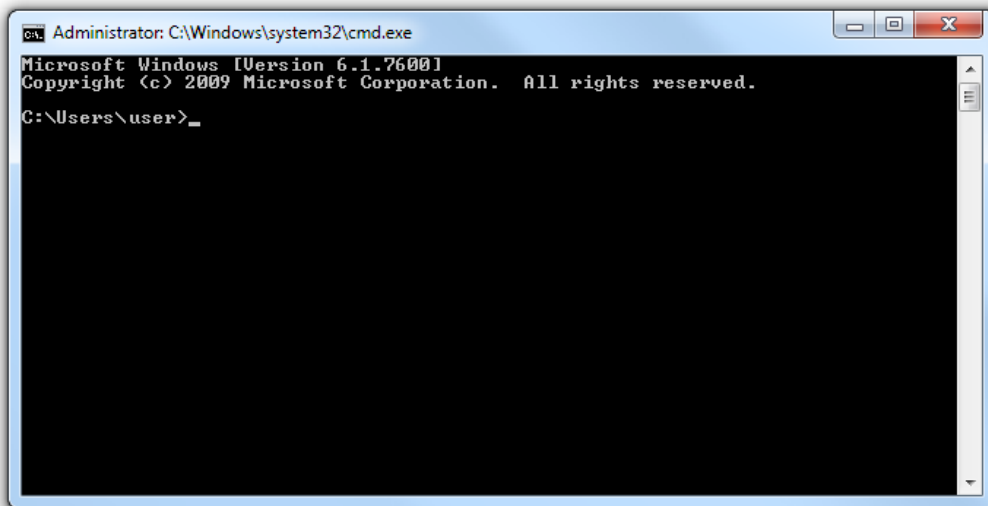
When you have configured how you want data to be output over TCP, run the job in a tryout loop or click the **Run** view to begin data output.

Here is how to view output using the TCP connection and AutoVISION's Emulator:

- While the tryout loop or the job is running, open **Run** from the Start Menu in Windows.



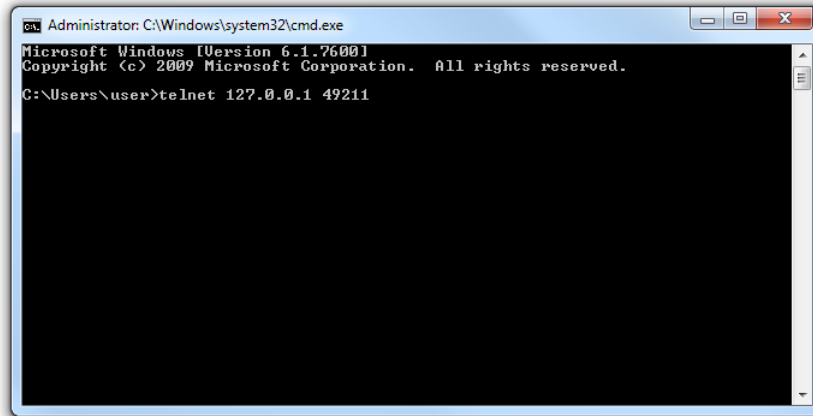
- Type **cmd** in the text field. This will bring up the Windows command line interface.



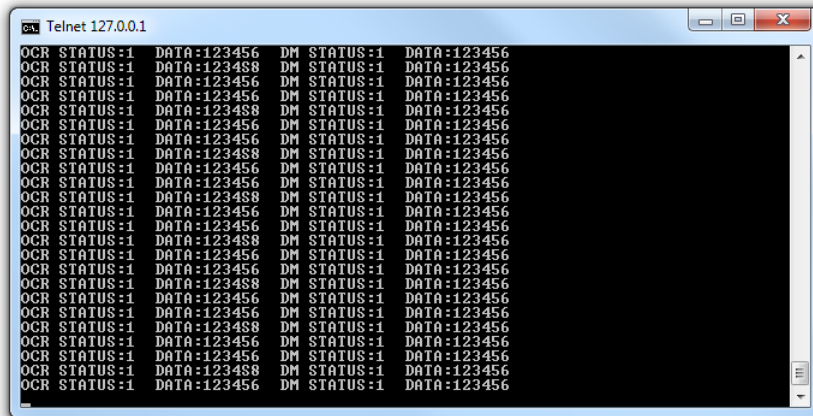
- At the prompt, type **telnet 127.0.0.1 4921x** (where 'x' = the TCP port number - for example, 49211, 49212, 49213, etc.) and **Enter**.

Note: 127.0.0.1 means "this computer".

Important: If you are connected to a camera, type **telnet [camera's IP address] 4921x** (where 'x' = the TCP port number – 49211 to 49215) and **Enter**.



- After you type **Enter** you will be connected to a Telnet session that shows data output as it was formatted on AutoVISION's **TCP/Serial Output** tab.



Microscan LINK

AutoVISION allows you to link tool parameters to tags within the Global Data Service (GDS). This makes it possible to "set and get" the parameter values via any GDS-supported protocol, including serial, TCP, and EtherNet/IP.

Link Buttons

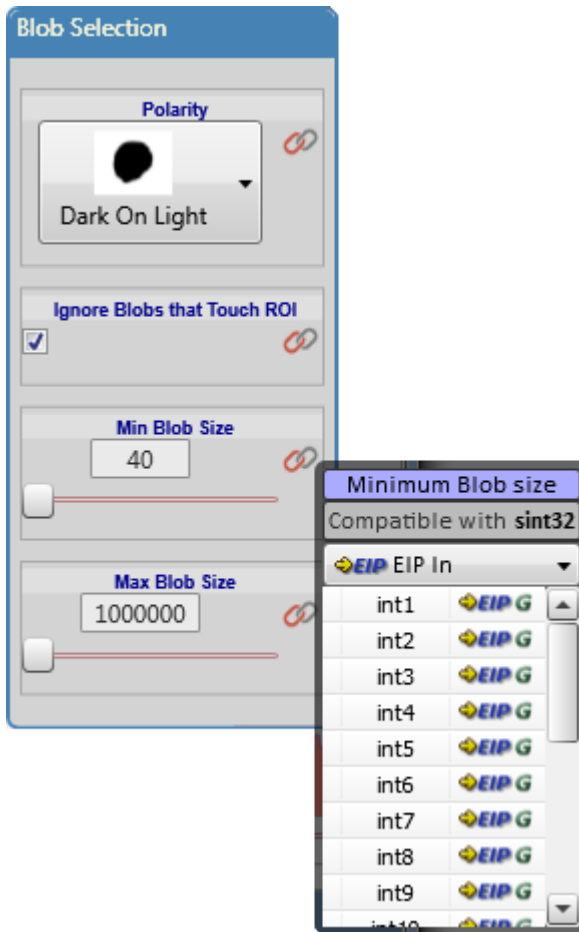


Link buttons appear throughout the editing views of AutoVISION. Linkable output parameters all have a Microscan LINK icon displayed next to them.

Example:

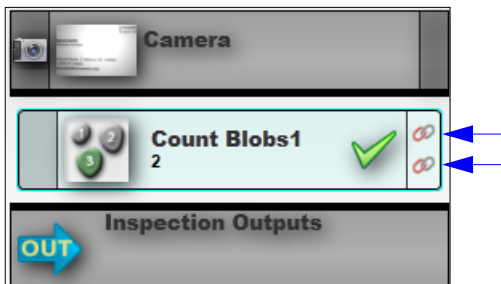


Clicking a link icon displays the **Link Menu** for that parameter:



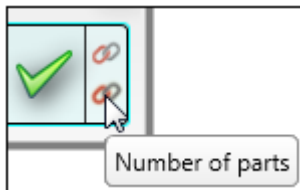
The Link Menu shows the names of compatible Global Data Service (GDS) tags. For example, the Min Blob Size parameter is an integer, so it can be linked to integers and longs.

The Link buttons for tool outputs appear in the right column of a tool within the tool list:



Microscan LINK

Hovering the mouse over any link button identifies its associated parameter as shown below:

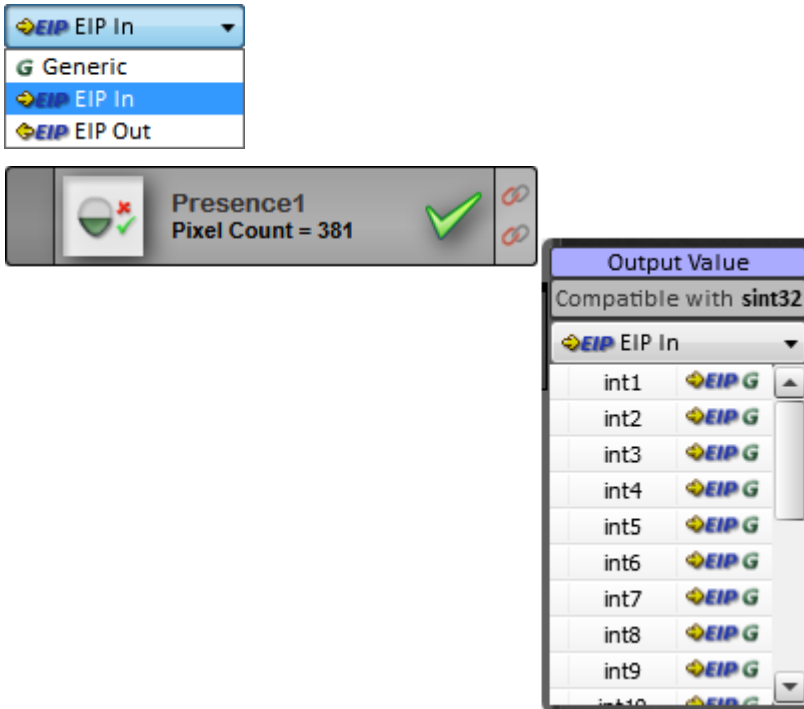


Clicking the link button displays the link menu populated with GDS tags of a compatible type. Once a parameter is linked, the background of the link button turns green:



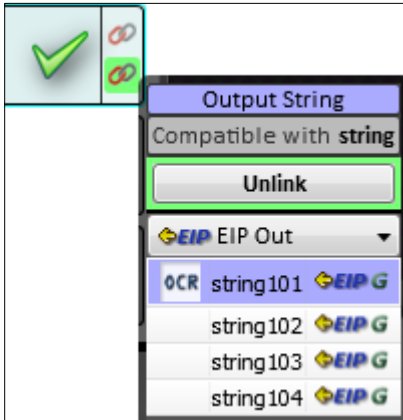
Link Menus

The **Link Menu** displays the compatible GDS tags to which the parameter can be linked. At the top of the menu is a dropdown that acts as a filter limiting the choices available. The first option, **Generic**, filters the list to include all 200 Generic tags. The second option, **EIP In**, filters the list to include only items that can be accessed via the EIP input assembly. The third option, **EIP Out**, filters the list to include only items that can be accessed via the EIP output assembly.



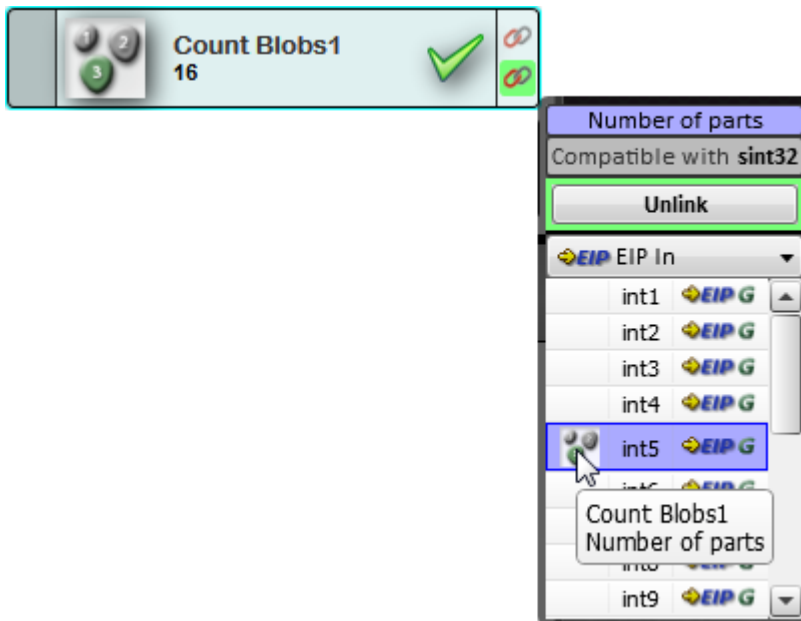
Microscan LINK

If the parameter has already been linked at the time the Link Menu is shown, an additional **Unlink** button appears at the top:



Clicking the Unlink button will remove the existing link.

An icon representing the corresponding tool appears next to any GDS tags that have already been linked. Hovering the mouse over the icon shows information about the tool it represents.



Data Navigator

The **Data Navigator** is a utility window that can be shown by clicking the link icon shown below or by typing the keyboard combination Ctrl + D. It allows you to browse the information stored in the Global Data Service (GDS).



At the top of the Data Navigator are buttons that show different views.

The **Tools** button shows the GDS information for each tool in the job.



The **Job Tags** button shows a summary of the GDS links in the current job.



The **Data Tags** button shows GDS information about the various EIP services.



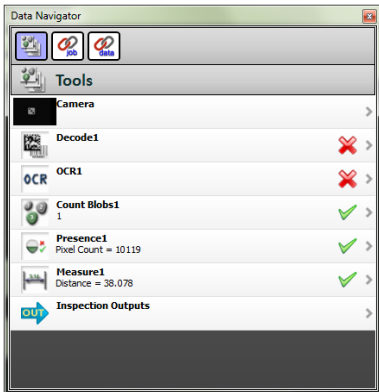
The Data Navigator can be shown while editing and also running a job. When displayed during Run mode, only the link button is visible.

Tools View

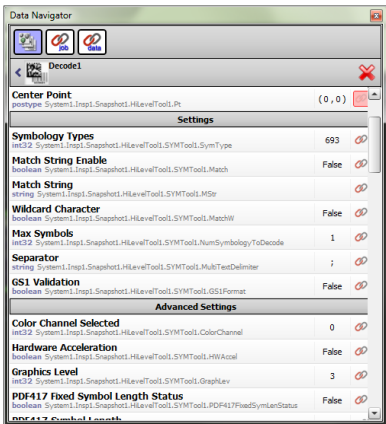
The **Tools View** is shown when you click the **Tools** button:



This view shows a summary of all of the linkable parameters for all the tools in the job. A typical tools view is shown here:



Each tool within the job is shown much as it would be shown in the tool list. For each tool, the icon, tool name, current output, and status are shown. There is a right arrow button to the right of the tool status icon that allows you to "drill down" to further information about the tool. For example, drilling down on Decode1 shows the following:



The header of this view shows the current tool and also a button to "drill up" or return to the previous view.

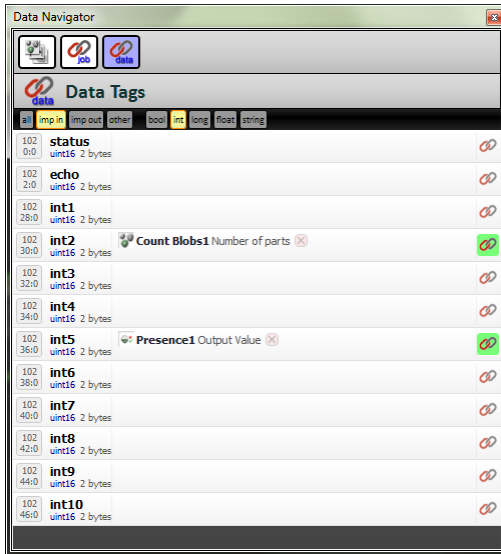
The parameters are displayed in a categorized list, along with GDS type and path information. The current value is also shown, but cannot be altered from this view. A link button is shown for any linkable parameters.

Data Tags View

The **Data Tags View** is shown when you click the **Data Tags** button:



This view shows information from the point-of-view of the EIP services. These include viewing the EIP explicit input and output assemblies, as well as those items accessible via explicit EIP messages. A typical EIP view is shown here:

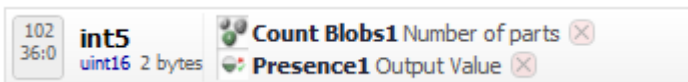


In the above example, the display is filtered to show only integers which are part of the EIP input assembly.

Each assembly item is shown along with its offset within the assembly, its size, and its links. Each of the links is shown, along with an **Unlink** button:



If more than one parameter is linked to the same location, a list of those parameters is shown:



Job Tags View

The **Job Tags View** is shown when you click the **Job Tags** button:



Each of the parameters that have been linked in the job are shown here, categorized by the tool to which they belong.

The items are displayed as follows:

OCR1 avp/Insp1/Snapshot1/HiLevelTool2		
Character Connection Strength data.int109	0	
Unknown Confidence Threshold data.float104	0.5	

Each tool that contains links is shown as a section header, along with its icon and GDS path. Within each tool section, each of the linked parameters is shown, along with its GDS path, current value, and a link button. The link button can be used as always – i.e., it displays a Link Menu with which one can change the link assignment or unlink the parameter. The value display within each item permits text entry, so a new value can be assigned to the linked parameter.

The following example shows how changing the Minimum Blob Size to 40 within the Data Navigator window writes the data to the linked parameter within the job, which then appears as the value in the parameter panel.

Count Blobs1 avp/Insp1/Snapshot1/HiLevelTool3		
Number of parts data.int2	1	
Lower Value data.int101	1	
Upper Value data.int102	5	
Minimum Blob size data.int103	40	

Dark On Light	
Ignore Blobs that Touch ROI <input checked="" type="checkbox"/>	
Min Blob Size 40	

A red circle highlights the value '40' in the 'Minimum Blob size' field of the 'Count Blobs1' section, and a red arrow points from it to the '40' value in the 'Min Blob Size' field of the 'Dark On Light' section.

Microscan LINK Serial Commands

ASSIGN [-automap] [-u] [-name=avp] [-range=n] [-count=n] {tagname}

Assign marks a tag or range of tags as in use by an application. Once marked as in use, the application will avoid those tags when attempting to auto-assign another tag range.

-automap = find the first unused set of 'n' tag indices

-u = un-assign tag

-name = name of application that is taking assignment

-range = maximum number of indices to search when -automap is used

-count = number of consecutive tag indices to assign

-tagname = tag to perform assignment on

For example, **ASSIGN -automap -name=avp -range=10 -count=2 int101**

will find the first set of 2 unassigned integers starting from int101 up to int110 and mark them as assigned by 'avp'. The index value is returned.

SET {tagname}{value}

Sets value of a global tag.

The tagname must correspond to one of the supported tags within the device.

The value can contain spaces.

The command is terminated by a carriage return and/or line feed character.

The value can be a list of comma-separated items to set a sequence of tags:

Send **SET int1 1, 2, 3** to set int1 = 1, int2 = 2, int3 = 3.

The AVP service allows setting of step and datum information from the job tree using forward slash '/' in the symbolic name path. **SET avp/insp1/snapshot1/acq1/gain 2.0** paths are not case-sensitive and do not need to be fully qualified if unique.

SET avp/acq1/gain 2.0 will set the same gain value if there is only one acquire.

Control tags in the AVP service such as **START**, **STOP**, and **TRIGGER** act as momentary switches. **SET avp.start 1** is equivalent to the **ONLINE** command. **avp.start** will reset immediately and always read as **0**.

Success Return: On success will return **!OK** followed by an echo of the command. For example:

!OK SET matchstring1 ABCD

Fail Return: On failure will return **!ERROR** followed by the reason for the failure. For example:

!ERROR Tag matchstring66 not found

GET {tagname}

Gets value of a global tag.

The tagname must correspond to one of the supported tags within the device.

The command is terminated by a carriage return and/or line feed character.

Include an index to get a single value from an array such as **GET int1**. If the index is omitted, the full array of values will be returned in a comma-separated list of values.

Send **Get {tagname}** to get the value of a tag within the global data service. To get the value of a tag within another service, prefix the tagname with the service name. For example, a **GET {service.tagname}** command such as **GET eip.input** for the EIP input assembly.

The AVP service allows retrieval of step and datum information from the job tree using forward slash '/' in the symbolic name path. **GET avp/insp1/snapshot1/status** paths are not case-sensitive and do not need to be fully qualified if unique.

GET avp/snapshot1/status will return the same result if there is only one inspection.

When issued against a step, **GET avp/snapshot1** will return the values for all datums.

Success Return: On success will return the value stored in the tag. For example:

ABCD

Fail Return: On failure will return **!ERROR** followed by the reason for the failure. For example:

!ERROR Tag matchstring66 not found

INFO {service.tagname or service}

Gets information about a tag or service.

INFO with no arguments gets a list of services.

INFO {service} gets a list of tags in that service.

INFO {service.tagname} gets attributes of the tag as well as a list of subtags.

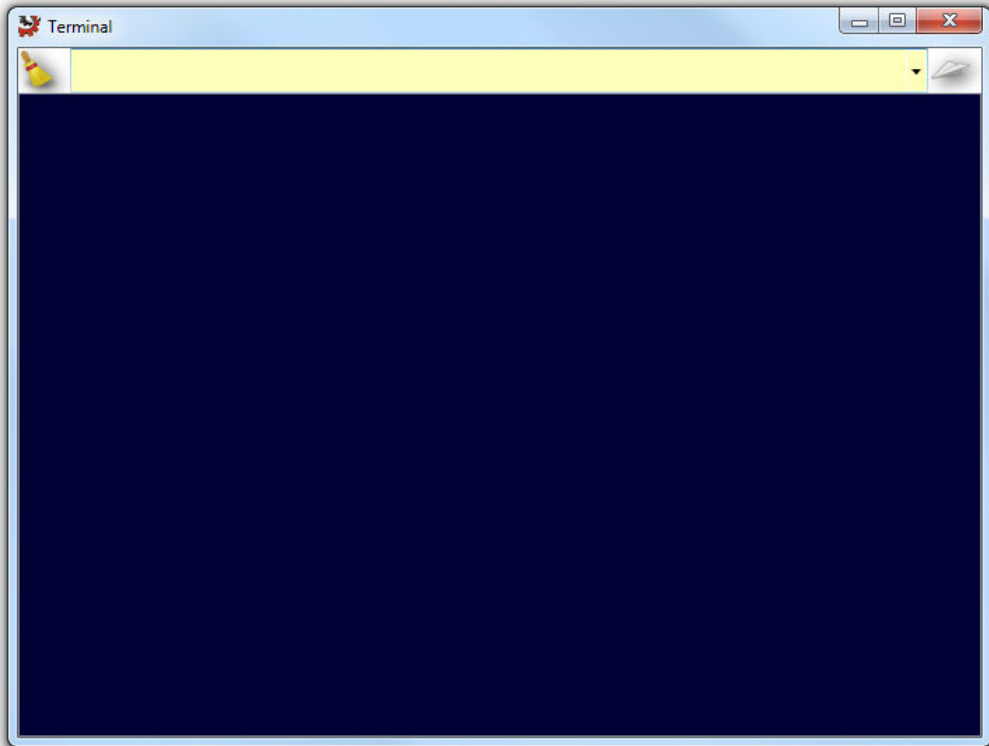
The AVP service allows retrieval of step and datum information from the job tree using forward slash '/' in the symbolic name path. **INFO avp/insp1/snapshot1/status** paths are not case-sensitive and do not need to be fully qualified if unique.

INFO avp/snapshot1/status will return the same result if there is only one inspection.

When issued against a step, **INFO avp/snapshot1** returns properties of the step, a list of child datums, and a list of child steps. Child steps are indicated by a trailing forward slash.

Terminal

To access the Terminal, type **Ctrl + T** on the keyboard. The following view will appear:



The Terminal can be used to send serial commands.

At the top of the Terminal is a field where commands can be typed. There are also two buttons:

Clear Display



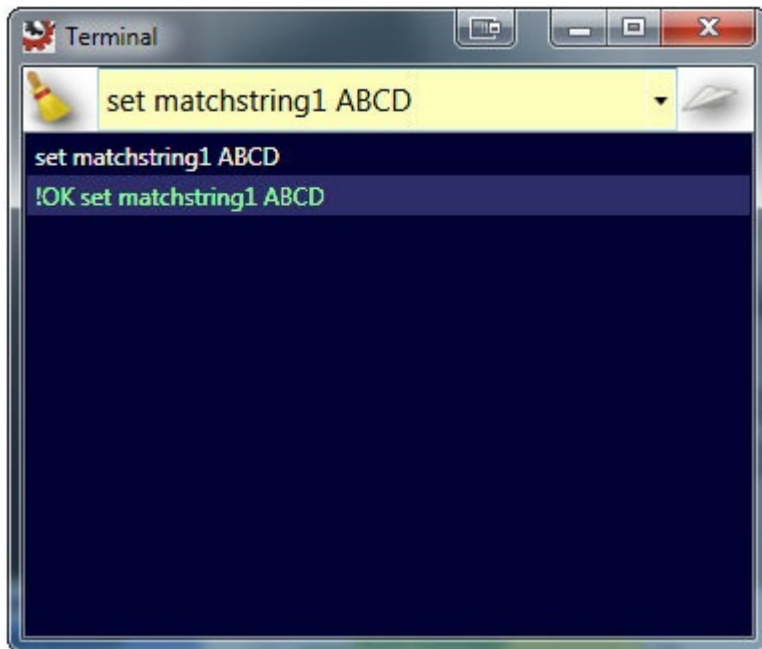
Send Entered Command to Currently Selected Device



Typing the Enter key on the keyboard will also send the command.

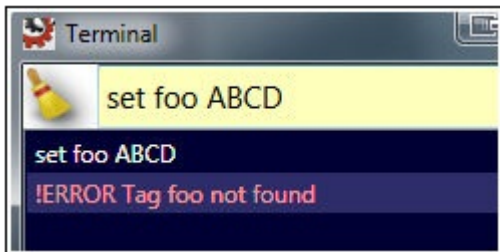
Setting a Match String with Terminal

Type a **SET** command followed by the string shown below:

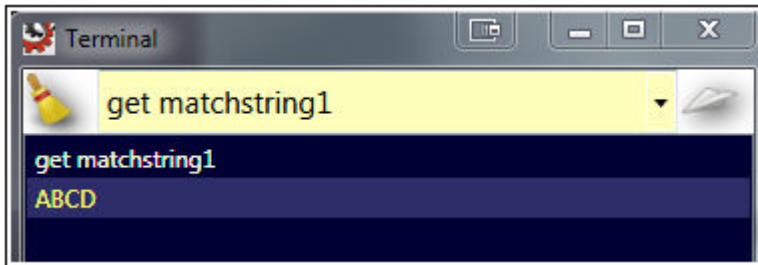


If the SET command is successful, the response will be **!OK** followed by an echo of the command.

If the command is not successful, the response will be **!ERROR** followed by text describing the error.

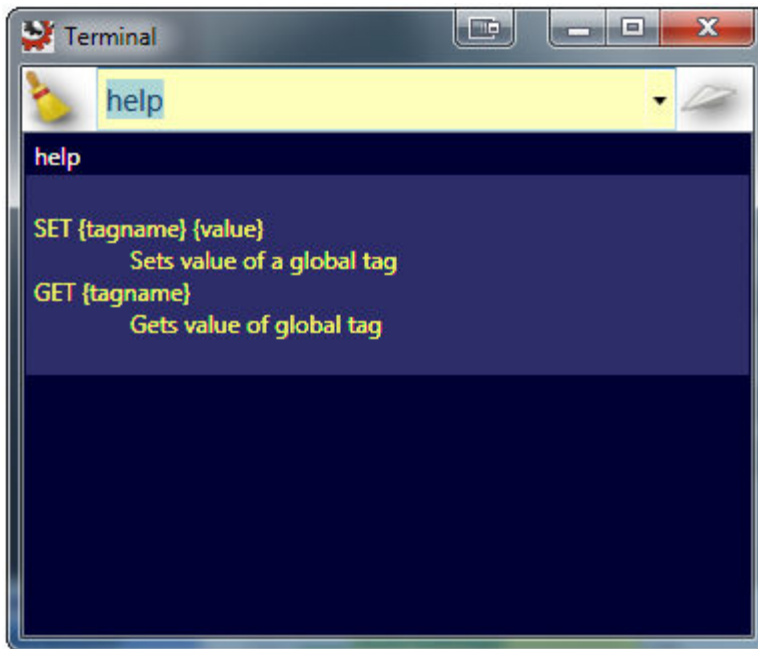


The following illustrates how to **GET** the value of “matchstring1”:



The response for a GET command returns just the value if the command succeeds. There is no beginning **!OK**, as in the SET command. However, an error condition will always begin with **!ERROR**.

The **HELP** command shows a list of the supported serial commands and their syntax:





5 *Run*

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Image Saving Options 5-4

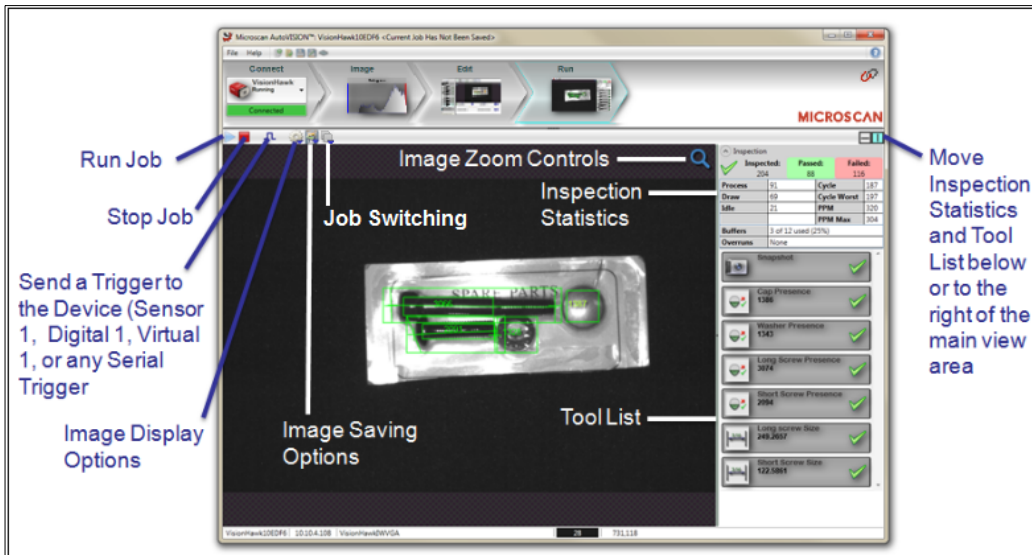
Inspection Statistics 5-5

This section describes the various elements of AutoVISION's Run view.

Run Overview

The **Run** view is a monitoring interface with real-time information, the ability to save images, and the ability to configure how images are displayed.

This view allows you to monitor current inspection status, and features image saving options (**Save No Images**, **Save All Images**, **Save Failed Images**, or **Save Passed Images**) as well as image display options.



The following sections describe **Image Display Options** and **Image Saving Options** in greater detail.

Important: Triggering from AutoVISION is intended for testing only and results in significant processing time variation. Use the actual trigger source for actual timing values.

Image Display Options



Image Display Options allow you to choose which images to display and how to display them. You can also determine how many images to display per second, or choose to show tool graphics (Decode Tool bounding boxes or OCR characters, for example).

☒ Show Tool Graphics

Image Display

☒ Show All Images

Show Only Failed Images

Freeze Display on Current Image

Freeze Next Failed Image

Freeze Last Failed Image

Display Speed

Maximum Rate, drop images when PC is busy

☒ 2 Images Per Second

4 Images Per Second

8 Images Per Second

Every Image (no drops)

Image Saving Options



Image Saving Options allow you to determine which kinds of images to save and where to save them. Select the folder where you want to save the images on your PC, and choose whether you want AutoVISION to save no images, all images, only failed images, or only passed images. You can also choose whether to display the images with graphics that show results of tool processes (Decode Tool bounding boxes or OCR characters, for example) or to save the images without those graphics.

Image Saving Options
Save Current Image...
Select Folder...
With Graphics (*.BMP)
☒ Without Graphics (*.TIF)
☒ Save No Images
Save All Images
Save Failed Images
Save Passed Images

Inspection Statistics

The Run view provides the following statistics:

- **Inspection Counts:** Displays the number of parts inspected, passed and rejected;
- **Inspection Timing Statistics:** Displays statistics on the speed of your inspection;
- **Tool Results:** Shows the Pass/Fail status and inspection data from each of your tools.

Inspection			
Inspected: 6191		Passed: 6191	Failed: 0
Process	6	Cycle	7
Draw	0	Cycle Worst	7
Idle	1	PPM	8571
		PPM Worst	8571
Buffers	2 of 16 used (12%)		
Overruns	None		

■ **6 *Firmware and License Upgrades***

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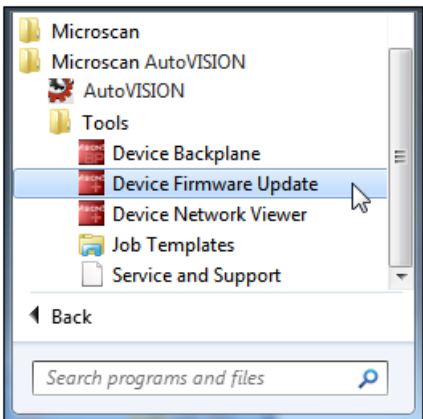
This section describes how to upgrade your camera's firmware using AutoVISION's Device Firmware Update feature, and how to upgrade your camera for use with Microscan's Visionscape software.

Updating Firmware

AutoVISION's simple **Device Firmware Update** feature makes it easy to download and install firmware on your camera.

To download and install firmware:

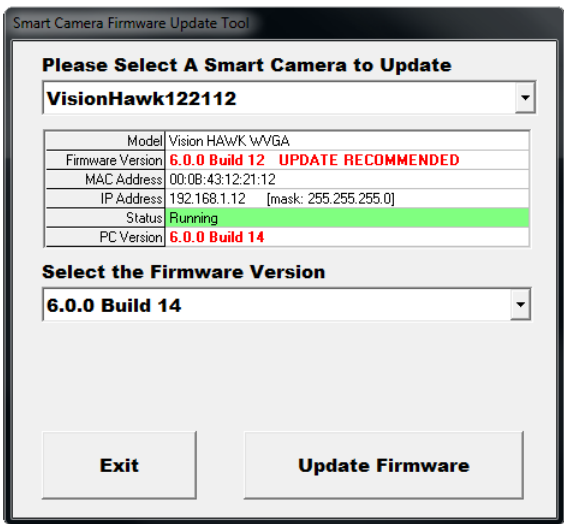
- Navigate to **Windows Start Menu > Programs > Microscan AutoVISION > Device Firmware Update**.



- After you click Device Firmware Update, the **Smart Camera Firmware Update Tool** will appear. Select your camera from the **Please Select a Smart Camera to Update** dropdown menu.

Note: Only cameras on the same network as your PC will be visible in this menu.

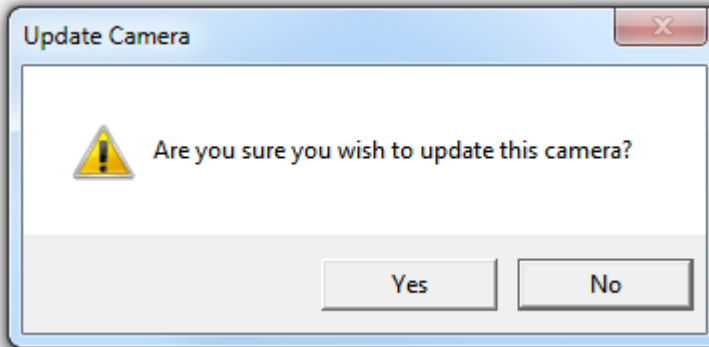
- Once you have selected your camera, its identifying details, such as **Model**, **Firmware Version**, **MAC Address**, **IP Address**, **Status**, and **PC Version** will be displayed.



- Select the desired version of firmware from the **Select the Firmware Version** dropdown menu. This menu will list all the firmware versions on your PC.

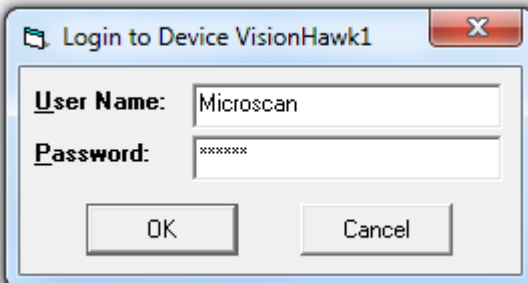
Note: The firmware versions shown below are representative examples and may not necessarily reflect what you see on the dropdown menu.

- Click the **Update Firmware** button.
- A dialog will appear asking **Are you sure you wish to update this camera?** Click **Yes**.



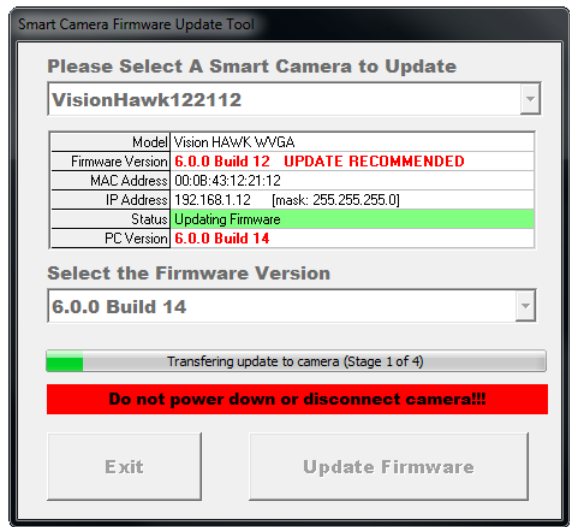
- If a username and password have been defined for the camera, a second dialog will then appear prompting you for your username and password.

Important: The username and password are both case-sensitive. Click **OK** after you have entered your username and password to begin the download and install process.

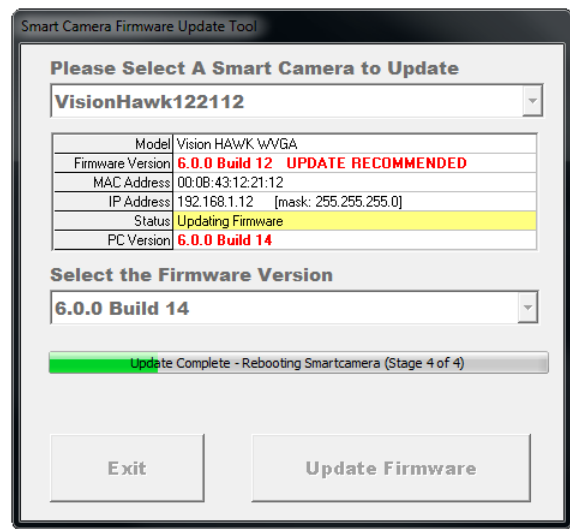


Updating Firmware

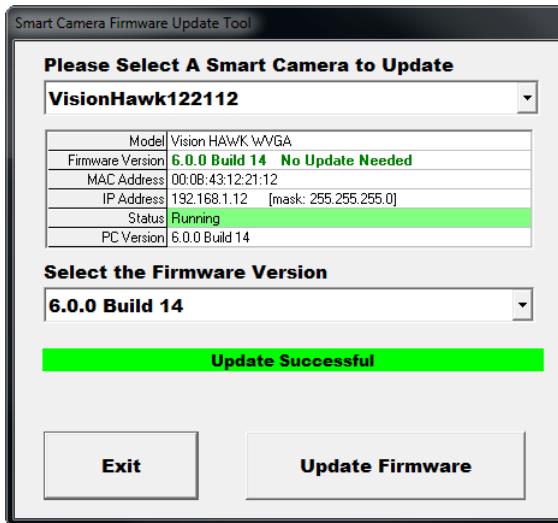
The firmware update process may take more than a minute for the Vision MINI and several minutes for the Vision HAWK.



Once the firmware is downloaded and installed, the camera will reboot.

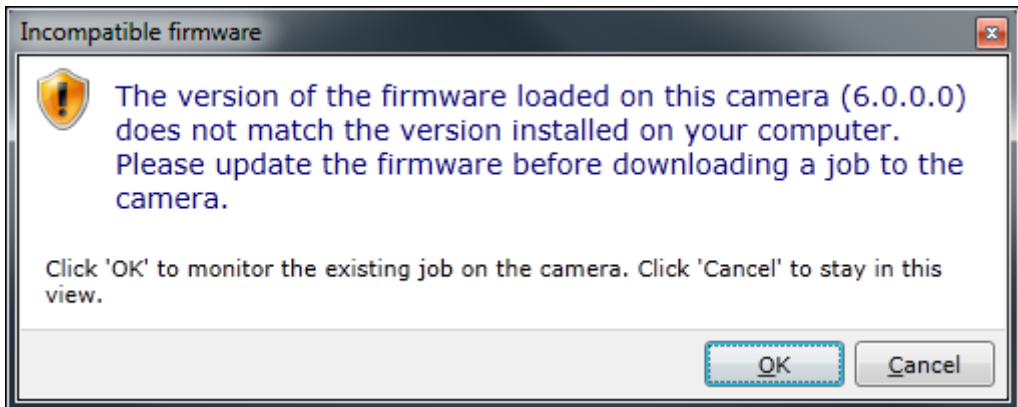


- When the entire firmware update process is complete, click the **Exit** button to close the utility.



Firmware Compatibility

Note that the camera's firmware version must match the version of Visionscape being used to manipulate a job on the PC. The following dialog will appear if the firmware and software versions do not match.

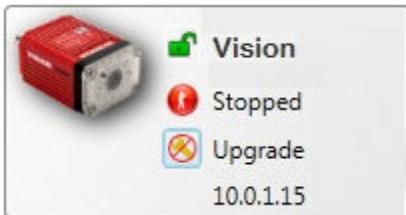


Camera License Upgrade

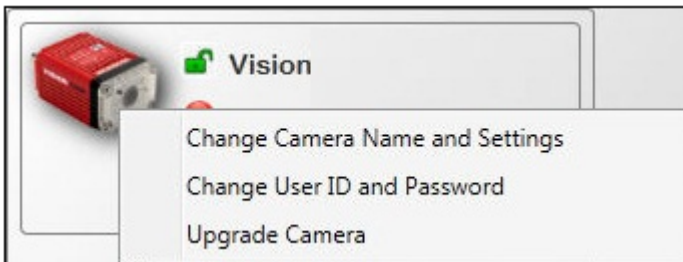
If your application requires more flexibility or configuration options, you can upgrade your camera for use with Microscan's Visionscape software. You will need to gather the relevant information about the camera to send to Microscan. Microscan will use that information to generate an upgrade key that will be sent back to you. You can then input the license key to enable the camera for use with Visionscape.

If the camera is not licensed you will need to select the upgrade option, either by clicking the **Upgrade** icon or by right-clicking the camera image and selecting **Upgrade Camera**.

Click the **Upgrade** icon:



Or right-click on the camera image and select **Upgrade Camera**:



The following dialog will then appear, allowing you to send an e-mail with the applicable information to Microscan.

This product is licensed for AutoVISION.

You can upgrade to full Visionscape capability which includes

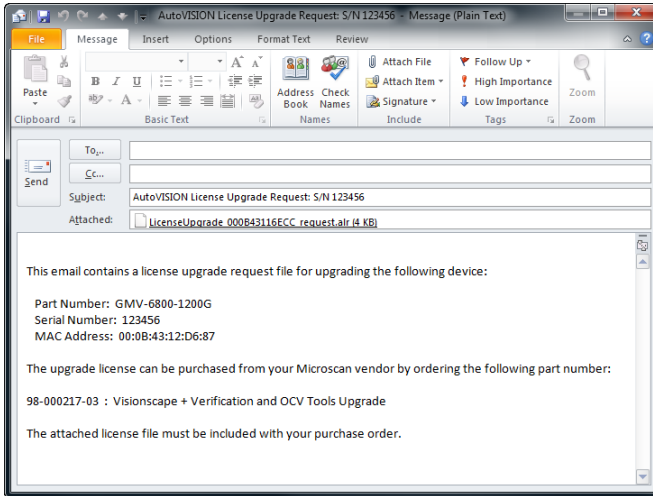
- Additional tools for image pre-processing, OCV, and feature extraction
- Support for calibrated precision measurements
- Advanced programming and custom tools
- Support for .NET and custom interfaces
- Ability to load and run legacy Visionscape jobs

To purchase an upgrade send the following information to orders@microscan.com

Part Number: GMV-6800-1202G
Serial Number: 123456
MAC Address: 00:08:43:12:D6:87

Already have the license key? Please enter it below

You can also copy the information to the clipboard and paste it into an e-mail program of your choice.



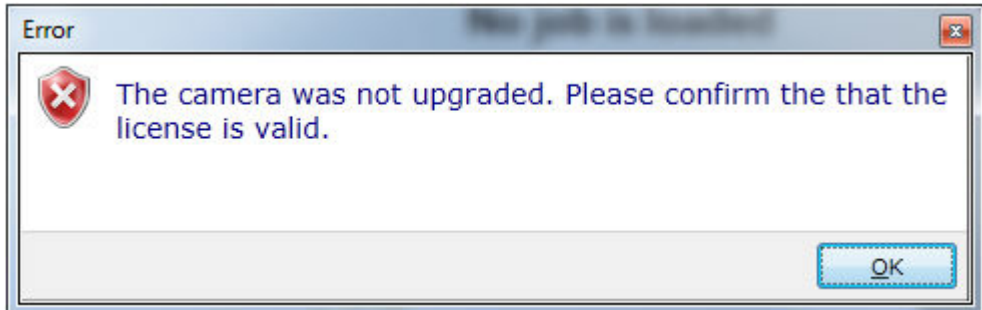
Once you receive the key from Microscan, you can enter it in the text field to upgrade the camera.

Already have the license key? Please enter it below

DE8FA-NM8XW-UA34C-HECFB-ATDDY

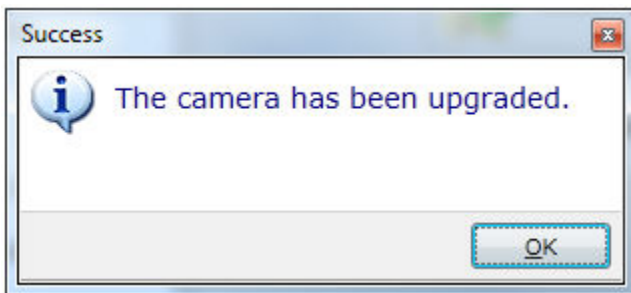
Upgrade

You will receive this error message if the license key is not valid:

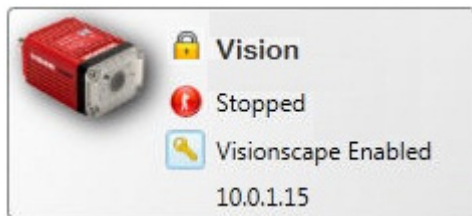


Camera License Upgrade

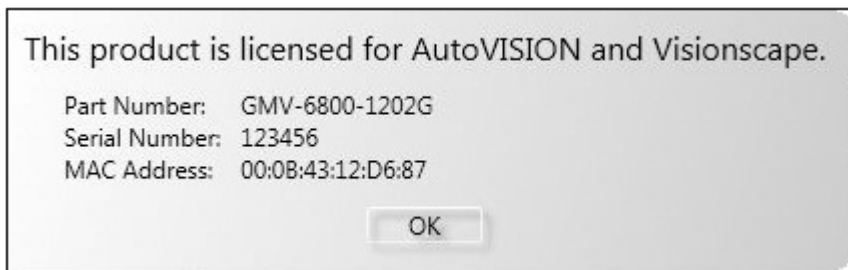
You will receive this message if the license key is valid and the camera is successfully upgraded.



Once the camera is upgraded, the following information will appear when the camera is selected:



At this time you can click on the key icon and the following dialog will appear, confirming that the camera has been upgraded:



7 Example Job: Gasket Inspection

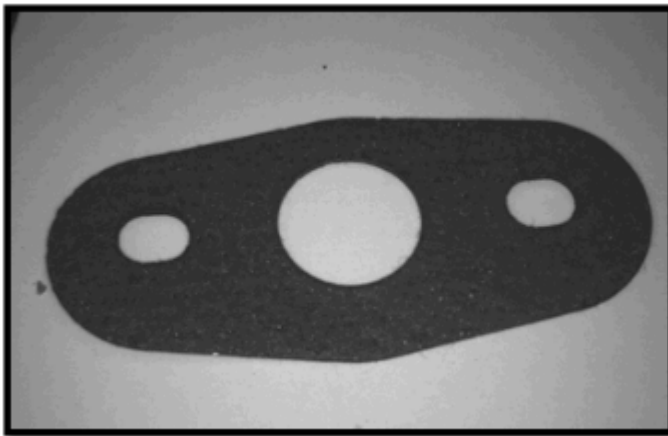
Contents

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This section demonstrates some of AutoVISION's tools and output capabilities in action. The purpose of the vision job in this example is to verify the following elements of an automotive gasket:

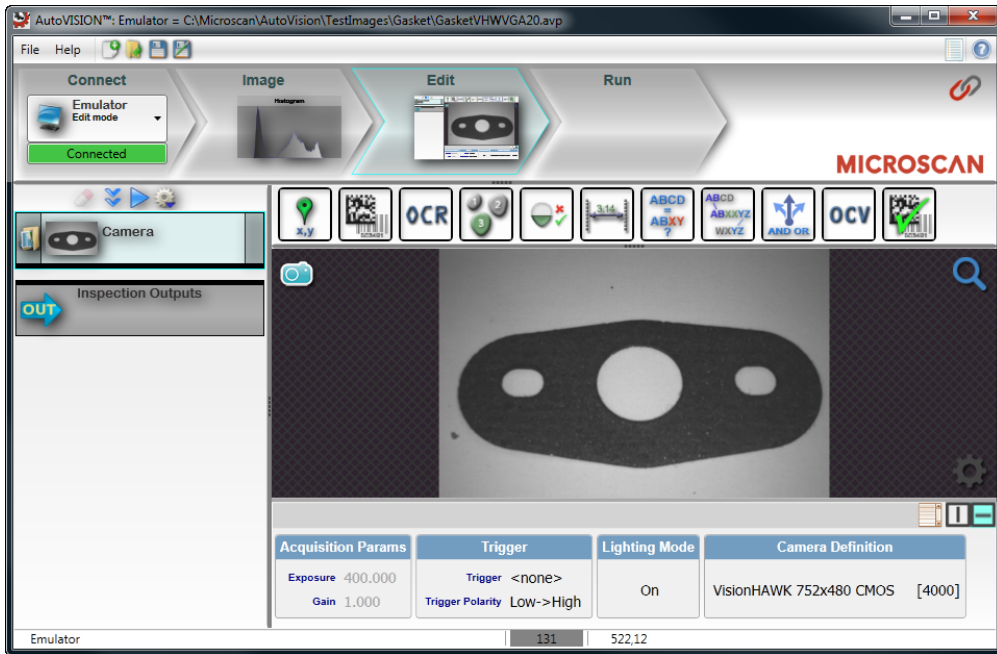
- Cut size
- Presence of bolt holes
- Correct size of center hole

and then to report the inspection status and gasket height.

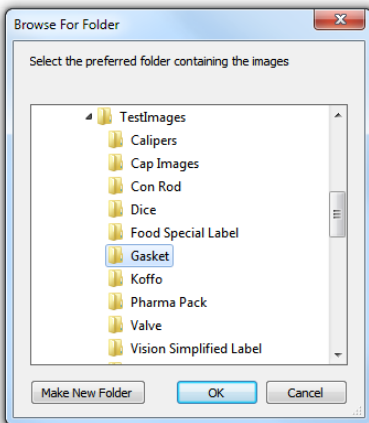


Start Gasket Job

- Select the **Emulator** from the **Select Device** menu in the **Connect** view.
- Create a new job and proceed to the **Edit** view.



- Select the directory in which the image you want to inspect is stored (in this example, an image of an automotive gasket). Click the folder icon to the left of the **Camera** tool. This will bring up the **Browse For Folder** dialog. Click on the folder containing the images you want to inspect, and then click **OK**.



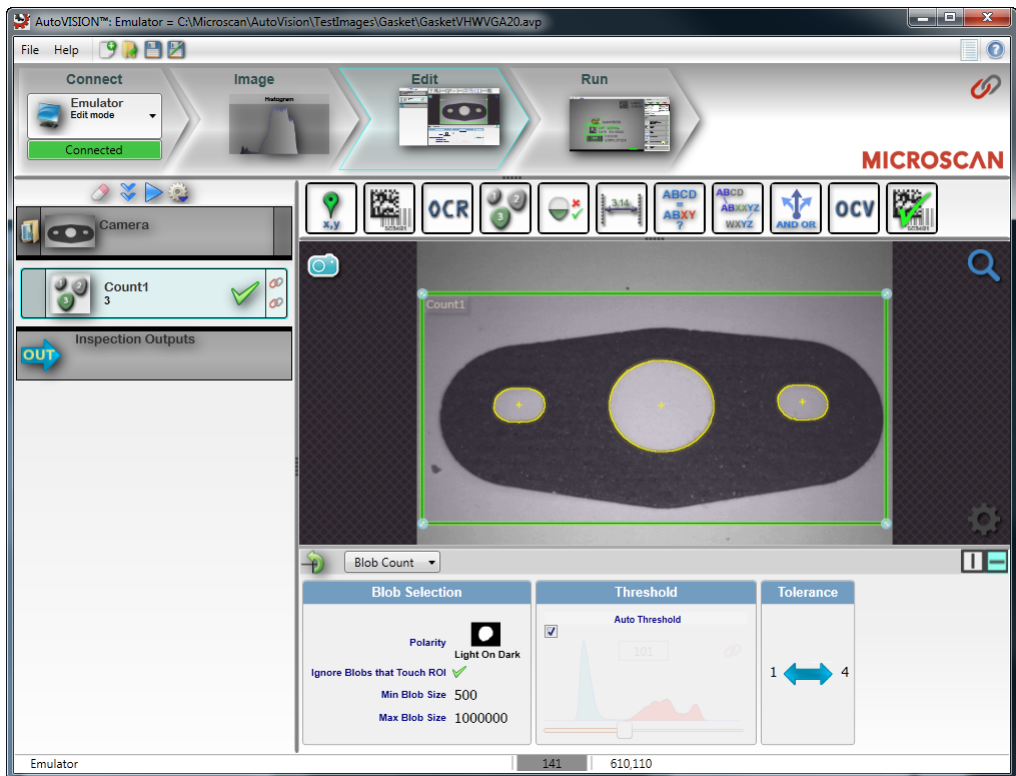
Add Measure Tool

Add a **Measure Tool** to check the height of the gasket.



Set the following Measure Tool parameters:

- **Function:** Height Measurement, Light Background to Dark Object
- **Edge Quality:** A Little Rough, Not Always Straight
- Set tolerances to accept good cuts but reject bad cuts



Hint: Double-click on the name of the tool (Count1) in the tool list on the left side of the interface to re-name the tool.

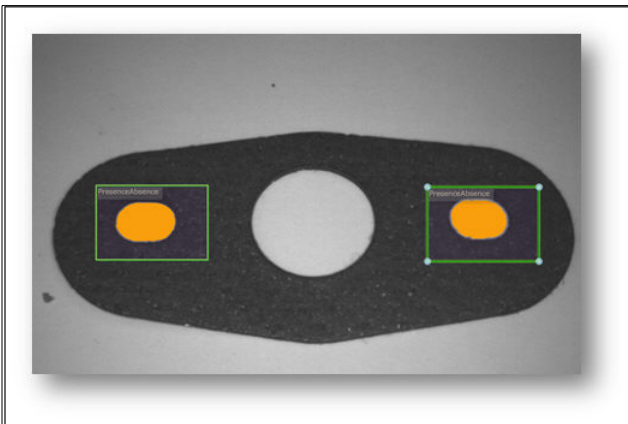
Add Three Presence/Absence Tools

Add two **Presence/Absence Tools**: one for each of the gasket's two smaller holes.



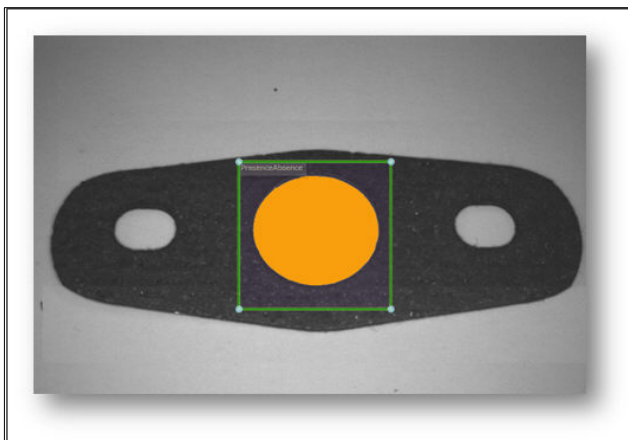
Set the following Presence/Absence Tool parameters:

- Adjust Threshold to look for light pixels.
- Adjust Limits so the tool fails when no hole is present.



Add a third Presence/Absence Tool to measure the size of the gasket's center hole.

- Adjust Threshold to look for light pixels.
- Adjust Limits so the tool fails when the hole is too small.



Report Gasket Inspection Status and Gasket Height

Click on **Inspection Outputs** in the job list to report inspection status and gasket height. Set the following output parameters:

- Use **TCP/Serial Output** for Emulator testing.
- Add formatting around inspection status and measurement value.

TCP/IP and Serial Out

String Output Port: TCP1 (49211) Decimal Places: 3 Error String:

Build Output String:

Inspection Outputs.Status Measure2.Measurement \n\r

- Telnet to 127.0.0.1 to check the data format.

```

Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:236.765
Inspection:1 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:236.765
Inspection:1 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:236.765
Inspection:1 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:236.765
Inspection:1 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:0 Gasket height:281.534
Inspection:1 Gasket height:281.534

```

Note: See [TCP/Serial Output](#) for a description of how to use Telnet to view TCP output.

Run the Gasket Job

Click on the **Run** section of the Navigator Bar to begin the job. The Run view allows you to watch the total number of inspections that pass and fail, as well as other data such as **Cycles**, **PPM** (Parts Per Minute), **Buffers** used, and **Overruns**.

